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National Metals Week

Institute of Metals Division Technical Sessions. Papers on Aging of Metals, Constitution of Alloy Systems and Physical Testing.

THE Institute of Metals of the American Institute of Mining and Metallurgical Engineers will hold its fall meeting at Cleveland, Ohio, Oct. 20-22, joining with the American Society for Metals, the American Welding Society, the Wire Association, and the American Society for Mechanical Engineers in the observance of National Metals Week.

The technical sessions will be held at the headquarters hotel, the Statler, except that the Wednesday afternoon sessions will be at the Cleveland Public Auditorium, the scene of the National Metals Exposition. A session on Aging of Metals and Constitution of Alloy Systems will be held and the Divisions will join the Iron and Steel Division of the A.I.M.E. in morning and afternoon sessions on Thursday, for a Round Table Discussion of Physical Tests and their Significance.

The dinner of the Metals Division will be held at the Statler Hotel on Wednesday evening, Oct. 21. Albert Sauveur will be the principal speaker.

The A.I.M.E. will have a booth at the National Metals Exposition near the main entrance, a convenient place for members and friends to meet as they enter or leave the metals show. There will be an interesting exhibit of metallic minerals, common and rare metals, typical uses of metallic elements, a series of charts illustrating the sources of the more important commercial metals and their flow in world trade, all illustrating the ramifications of the mineral and metal industries and typifying the scope of A.I.M.E. interests from the location of commercial ore deposits to the use of the refined or derived mineral products in every-day life.

This exhibit has been arranged through the cooperation of a great number of the metal producing companies, and the Federal Bureaus of Foreign and Domestic Commerce and of Mines.

Program

All sessions at the Statler Hotel except on Wednesday afternoon when sessions will be at the Cleveland Public Auditorium.

Monday, October 19
10:00 a.m. to 5 p.m.—Registration

Tuesday, October 20
9:00 a.m.—Registration
10:00 a.m.—Institute of Metals Division

AGING OF METALS

"Aging Phenomena in Silver Copper Alloys," by Morris Cohen.
"Age Hardening of Aluminum Alloys," by W. L. Fink and Dana Smith.
"Precipitation Hardening and Double Aging," by R. H. Harrington.

Wednesday, October 21

12:15 p.m.—Luncheon Meeting, Institute of Metals Executive Committee.

2:00 p.m.—Institute of Metals Division (Exposition Auditorium).

CONSTITUTION OF ALLOY SYSTEMS

"Solid Solubility of the Elements of the Perodic Sub Group Vb in Copper," by J. C. Mertz and C. H. Mathewson.

"Equilibrium Relations in the Ni-Sn System," by William Mikulas, Lars Thomassen and Clair Upthegrove.

"Equilibrium Relations in Al-Mg-Zn System," by W. Fink and L. A. Willey.

"Note on Etching and Microscopic Identification of Constituents of Cu-Zn Alloys," by I. L. Rodda.

S. L. HOYT
who will read Papers on "Transverse Notched Bar Tests," and "Metallic Single Crystals and Plastic Deformation"

6:30 p.m.—Dinner, Institute of Metals and Iron and Steel Divisions, Statler Hotel. Speaker, Professor Albert Sauveur; subject, "Metallurgical Reminiscences."

Thursday, October 22

9:30 a.m.—Joint session, Iron and Steel and Institute of Metals Divisions. Round Table Discussion of Physical Tests and their Significance.

Tensile Testing:

Stress-strain Relations—C. H. Gibbons
Yield-tensile Ratio—R. L. Templin; Jonathan Jones; Rudolph Bernhard
Poisson's Ratio—Robert W. Vose
Fatigue—H. F. Moore

2:00 p.m.—Joint Session, Iron and Steel and Institute of Metals Divisions.
Round Table Discussion of Physical Tests and Their Significance (Continued)

Impact Testing:

Transverse Notched Bar Test—S. L. Hoyt
Tension Impact—H. C. Mann

Bend Testing:

General Discussions of Bend Tests—J. R. Townsend
Bend Testing as Applied to Welds—Wilbur B. Miller
Other non-ferrous papers, general papers and events

D. K. CRAMPTON
who will read a Paper on "Extrusion of Metals"

of a nature allied to the non-ferrous metals through their treatment of fundamentals include the following:

Monday Morning, Oct. 19
Statler Hotel

Cadmium Alloys for Bearings, by C. F. Smart
Diffusion of Hydrogen through Nickel and Iron, by W. R. Ham

Monday Afternoon—Public Auditorium

Lecture on Physical Testing of Metals by H. D. Churchill

8 P. M.—Public Auditorium

Lecture on X-Ray Analysis, K. R. VanHorn

Tuesday Morning, Oct. 20
Statler Hotel

The Effect of Titanium on Some Cast Ferrous and Nonferrous Metals by J. A. Duma

J. R. TOWNSEND
who will read a "General Discussion of Bend Tests"

4:30 P. M.—Public Auditorium

Lecture on Physical Testing of Metals by H. D. Churchill

8:00 P. M.—Public Auditorium

Lecture on X-Ray Analysis by K. R. VanHorn

Wednesday Morning, Oct. 21

Annual Meeting and Campbell Lecture

4:30 P. M.—Public Auditorium

Lecture on Physical Testing of Metals by H. D. Churchill

8:00 P. M.—Public Auditorium

Lecture on X-Ray Analysis by K. R. VanHorn

Thursday Morning, Oct. 22

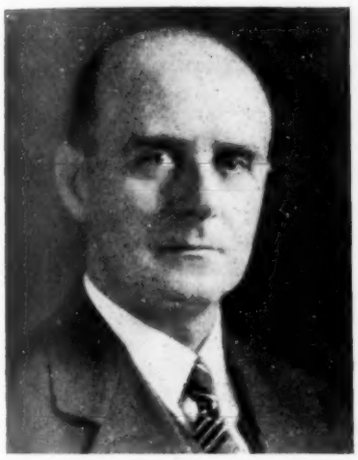
Statler Hotel

Symposium on the Plastic Working of Metals

X-Ray Study of Preferred Orientations in Pure Cold-Rolled Iron-Nickel Alloys by D. McLachlan, Jr. and W. P. Davey

Application of X-Ray Diffraction to the Study of Fatigue in Metals by C. S. Barrett

X-Ray Diffraction Studies of Distortion in Metals by G. L. Clark and M. M. Beckwith



O. W. ELLIS

who will read a Paper on "Effect of the Shape of the Test Piece Upon the Energy Needed to Deform Materials in the Single Blow Drop Test"

Thursday Afternoon—Public Auditorium

Symposium on the Plastic Working of Metals

4:30 P. M.—Public Auditorium

Lecture on Physical Testing of Metals by H. D. Churchill

Friday Morning, Oct. 23

Statler Hotel

Symposium on the Plastic Working of Metals

Conversion of Elongation Data from One Form of Test Piece to Any Other by E. J. Janitsky

Friday Afternoon—Public Auditorium

Symposium on the Plastic Working of Metals

Recovery of Cold Worked Nickel at Elevated Temperatures by Erich Fetz

4:30 P. M.—Public Auditorium

Lecture on Physical Testing of Metals by H. D. Churchill

Symposium on the Plastic Working of Metals

To be held on Thursday morning and afternoon, October 22nd, and Friday morning and afternoon, October 23rd.

Laws and Fundamentals of Plastic Deformation by A. V. deForest

Metallic Single Crystals and Plastic Deformation by S. L. Hoyt

Creep Characteristics of Metals at Elevated Temperatures by C. L. Clark and A. E. White

Interpretation and Use of Creep Results by J. J. Kanter

Elastic Properties and Their Relationship Strain Hardening by M. F. Sayre

Effect of the Shape of the Test Piece Upon the Energy Needed to Deform Materials in the Single Blow Drop Test by O. W. Ellis

Hot Working, Cold Working and Re-Crystallization Structure of Metals by N. P. Goss

Factors Relating to the Production of Drop and Hammer Forgings by Adam Steever

Hot Press and Upset Forgings by J. H. Friedman

Extrusion of Metals by D. K. Crampton

Damping Characteristics of Metals by G. R. Brophy

Exhibitors and Their Products

Four Acres of Space and 210 Exhibitors. A List of Those Related to Non-Ferrous Metals and Metal Finishing

Ajax Electric Co., Inc., Philadelphia.

Exhibiting: Salt bath furnace, Ajax-Hultgren furnace for cyaniding, hardening, annealing and tempering. Display of photographs showing various types of Ajax Electric heat treating furnaces.

In attendance: **G. H. Clamer,** president; **William Adam, Jr.,** vice president; and **J. E. Haig,** secretary.

Ajax Electrothermic Corp., Trenton, N. J.

Exhibiting: Zone hardening with high frequency currents in co-operation with the Ohio Crankshaft Co. A production size high frequency melting furnace and a number of enlarged pictures of high frequency furnace installations and products.

In attendance: **G. H. Clamer,** president and general manager; **E. F. Northrup,** vice president and technical adviser; **Dudley Willcox,** treasurer and assistant general manager; **R. N. Blakeslee, Jr.,** secretary and sales manager; **A. D. Meyer,** sales metallurgist; **H. G. Remmers,** electrical engineer; **F. T. Chesnut,** electrical engineer; and **G. F. Applegate,** shop foreman.

Aluminum Co. of America, Pittsburgh.

Exhibiting: Newest developments in aluminum alloys and their applications.

In attendance: Executives of sales, operating and research divisions.

American Brass Co., Waterbury, Conn.

A selection of high strength copper alloys. These will include Everdur metal, beryllium copper, Tempaloy, Tobin bronze and various prosphor bronze alloys. They will be shown in commercial and fabricated forms. An interesting feature of

this exhibit will be a welding demonstration booth, where an Anaconda welding engineer will demonstrate all types of welding with bronze rods and will also show long arc, high voltage welding on copper.

American Cyanamid & Chemical Corp., New York.
Exhibiting: Aerocase case hardening compounds; sodium cyanide; cyanide case hardening compounds; electroplating chemicals; and chemicals to the ferrous and non-ferrous industries.
In attendance: **R. H. Lands**, sales department; **C. Byron**, sales department; **P. E. Holder**, sales department; **G. D. Johnston**, technical department; and **J. S. Meyer**, technical department.

American Electric Furnace Co., Boston.
Exhibiting: A complete photographic display of standard Juthe gas and "American" electric furnaces, including installations.
In attendance: **K. A. Juthe**, president; **S. N. Juthe**, vice president; **J. C. Juthe**, sales manager; **A. A. Anderson**, Ohio representative; **E. E. Bolds**, Ohio representative; **C. Adams**, Michigan representative; **R. Ruddock**, Michigan representative; **A. D. Heath**, Indiana representative; **C. J. Boeringer**, Western Pennsylvania representative; and **E. Johnson**, Illinois representative.

American Foundry Equipment Co., Mishawaka, Ind.
Exhibiting (in operation): An operating display of the Wheelabrator mechanism in a glass cage, which is airless abrasive method of cleaning castings, descaling forgings or other metal products in preparation for final finishes, such as stove castings, automobile gears, drop forgings, metal stampings and similar products.
In attendence: **Martin H. Kidder**, industrial relations director; **Otto A. Pfaff**, vice president; **L. L. Andrus**, assistant sales manager; and **J. D. Alexander**, district sales manager.

American Gas Association—Industrial Gas Section, New York.
In attendance: **Karl Emmerling**, chairman display and contact committee, The East Ohio Gas Co., Cleveland, Ohio; **H. C. Haroldson**, vice chairman display and contact committee, The Commonwealth & Southern Corp., Jackson, Mich.; **A. T. Code**, The East Ohio Gas Co., Cleveland, Ohio; **E. D. Milener**, secretary Indiana Gas Section, American Gas Association, New York, N. Y.; and representatives of various gas equipment manufacturing companies.

American Gas Furnace Co., Elizabeth, N. J.
Exhibiting (in operation): A small rotary carburizing machine, a vertical bell type retort furnace for carburizing, nitriding, clean annealing, "Ni-Carb-Casing." Also a small demonstrating full muffle reciprocating heating machine for hardening in a controlled atmosphere with freedom from scaling or decarburization, also for annealing. Other items exhibited will be a high heat melter, an improved pot hardening furnace, improved oven and tool room furnaces, burners, blowpipes, flow meters, heat controllers, etc. A new oven furnace, top and bottom fired from both sides and bottom vented.
In attendance: **P. C. Osterman**, vice president; **E. C. Cook**, sales manager; **G. A. F. Machlet**; **John Mehrman**; **Theodore Farwick, Sr.**; **W. J. Barenscheer**; **W. H. Kelsey**; **S. C. Dinsmore**; **S. P. Rockwell**; **W. A. Stumpf**; **O. T. Muehlemeyer**; **A. I. Brokaw**; and **R. C. Schwarz**.

Ampco Metal, Inc., Milwaukee.
Exhibiting: The various grades of Ampco and Atlas metals and test specimens indicating high physical properties and compressive resistance. Typical parts showing the application of these metals in machine tools, steel mill equipment, pickling parts, forming dies, and safety tools.
In attendance: **C. J. Zaiser**, president and general manager; **J. D. Zaiser**, sales engineer; **G. K. Dreher**, plant superintendent; **R. W. Uecker**, treasurer; **J. S. Morrison**, Cleveland representative; and **F. S. Wellman**, Cleveland licensee.

Anderson & Sons, Springfield, Mass.
Exhibiting: Etched and lithographed metal products, such as nameplates, signs, dials and novelties.
In attendance: **Roland E. Anderson**, owner; and **Theodore S. Hall**, representative (Cleveland).

Armstrong Cork Co., Lancaster, Pa.
High temperature insulation products for all types of heated equipment.

Automatic Temperature Control Co., Inc., Philadelphia.
Exhibiting (in operation): Relatrol control system, the Atc balancer, various two and three-position control mechanisms, current input controllers for electric furnaces with both manual and automatic adjustment; and dial, cam and reset timers.
Control valves for air, gas, water, oil and steam.
In attendance: **J. D. Andrews**, sales manager; **O. W. Stowe**, engineer; **G. S. Frazee**, Pittsburgh representative; **Carman Adams**, Detroit representative; **F. I. Tourtelot**, Chicago representative; **R. M. Booth**, Cincinnati representative; and **J. T. Couchman**, Indianapolis representative.

Babcock & Wilcox Co., Refractories Div., New York.
Exhibiting: An animated display showing the unusual savings effected through the use of Babcock & Wilcox insulating firebrick, but featuring the characteristics of light weight, low thermal conductivity, and high temperature strength. Reports giving the amount of savings in actual installations will be available as well as information on special forms of constructions.
In attendance: **J. E. Brinckerhoff**, sales manager; **F. B. Cornell**, salesman; **R. M. Onan**, salesman; **H. J. Shaner**, salesman; **W. A. Stuart**, salesman; and **M. J. Terman**, salesman.

Baldwin-Southwark Corp., Philadelphia.
Exhibiting (in operation): Southwark-Emery universal testing machine equipped with the new Tate-Emery multi-range load indicating dial, first time publicly shown. High speed R. R. Moore rotating beam fatigue testing machine using standard size specimen.
In attendance: **C. H. Gibbons**, assistant sales manager, Southwark division; **F. G. Tatnall**, manager testing machine department; **Dr. Rudolf Bernhard**, development engineer; and **M. C. Tate**, development engineer of the **A. H. Emery Company**.

Bastian Blessing Co., Chicago.
Exhibiting (in operation): Oxy-acetylene welding

and cutting equipment, torches, regulators, manifolds, etc. Liquefied petroleum regulators, manifolds and special valves. Continuous demonstration of an efficient gas cutting operation in which the observers may estimate the quantity of oxygen consumed each day. A daily prize is offered for the closest estimate. Additional demonstrations of hand welding and cutting operations.

In attendance: **E. L. Mills,** vice president and sales manager; **E. M. Evleth,** engineer; **H. A. Goodwin,** district sales manager; and **H. O. T. Ridlon,** district sales manager.

Bausch & Lomb Optical Co., Rochester, N. Y.

Exhibiting (in operation): Complete line of optical instruments for metallography and spectrography. Wide field binocular microscope and the new metallographic equipment of advanced type for research. A full line of cameras, metallographic microscopes, Brinell microscopes, etc.

In attendance: **C. C. Nitchie,** sales engineer; **H. L. Shippy,** Detroit representative; **T. L. Bourne,** Buffalo representative; **M. H. Stevens,** Rochester representative; **I. L. Nixon,** sales manager; and **L. V. Foster,** optical engineer.

Bethlehem Steel Co., Bethlehem, Pa.

Exhibits of finished products of various applications of Bethanized wire.

G. S. Blakeslee & Co., Cicero, Ill.

Exhibiting (in operation): A spiral oil quenching and washing machine for handling automatic parts that have been heat treated, quenched in oil, and want to be cleaned. Also the Blakeslee line of degreasing machines using Blacosolv, a chlorinated solvent, to remove the oil and grease from work prior to plating, painting, assembling, or inspection. The metal parts are rendered chemically clean and dry without any streaks, spots, runs, stains, or marks.

In attendance: **J. W. Dammers,** treasurer; **H. E. Carlson,** sales engineer; **F. J. Strock,** sales engineer; and **A. S. Reichel,** sales engineer.

Botfield Refractories Co., Philadelphia.

Bristol Co., Waterbury, Conn.

Exhibiting (in operation): Bristol's wide-strip recording potentiometer; the metameter telemetering system; the pyromaster, and the pyrotrol. These are all new developments.

In attendance: **H. L. Griggs,** vice president and sales director; **L. G. Bean,** sales manager; **H. E. Beane,** field sales manager; **C. W. Williamson,** district manager, Pittsburgh; **R. M. Walker,** district manager, Chicago; **C. Worth,** sales engineer; **W. F. Abbott,** sales engineer; **E. R. Wyatt,** sales engineer; **E. B. Janvrin,** sales engineer; and **H. W. Lancaster,** sales engineer.

Brown Instrument Co. A Division of Minneapolis-Honeywell Regulator Co., Philadelphia.

Exhibiting (in operation): Indicating, recording and automatic control instruments used in the production, fabrication and heat treatment of both ferrous and non-ferrous metals. Automatic control systems for different types of furnaces and different heating mediums including new designs of industrial motor valves and air-operated control equipment. The optimatic pyrometer for recording rapidly changing temperatures or the temperature of moving objects. Potentiometer pyrometers, flow meters, thermometers, millivoltmeter pyrometers, pressure gauges, CO_2 meters, radiation pyrometers, furnace atmosphere recorders and combustion safeguard equipment.

In attendance: **L. M. Morley,** vice president and general sales manager; **R. L. Goetzenberger,** vice president; **J. R. Green,** assistant sales manager; **H. M. Schmitt,** engineer market development department; **R. H. Perry,** industrial manager, Cleveland office; **H. A. Woolman,** Cleveland representative; **J. L. Whitten,** Pittsburgh representative; and **C. W. Lugar,** industrial representative.

Adolph I. Buehler, Chicago.

Exhibiting (in operation): A-B specimen cutting machines; A-B bakelite presses; A-B specimen grinders; A-B specimen polishers; A-B specimen holders; also latest metallographic microscopes of Bausch & Lomb, Leitz and Carl Zeiss, manufacture.

In attendance: **Adolph I. Buehler** and assistants.

Bullard-Dunn Process Division of The Bullard Co., Bridgeport, Conn.

Exhibiting (in operation): The Bullard-Dunn Electro-Chemical Process for descaling metals. A demonstration unit comprising small glass tanks which permit the observation of the cleaning action with the simultaneous deposition of a protective metal coating. A moving picture demonstration of the Bullard-Dunn continuous rotary immersion machine as applied to an actual commercial installation of the process and display of a variety of work samples.

In attendance: **R. C. Bullard,** advertising manager; **Thomas H. Wilbur, Floyd T. Taylor,** and **Earl T. Youd.**

Burdett Manufacturing Co., Chicago.

Exhibiting (in operation): Burdett Radiant Heat Gas Burners (radiant refractory discs). Gas burning equipment for: white metal melting, metal annealing, industrial ovens, forging furnaces, glass melting, glass annealing, varnish cooking, etc.

In attendance: **J. E. Orr,** sales manager; **T. P. Tessmer,** factory superintendent; and **C. F. Petersen,** factory representative.

Calorizing Co., Pittsburgh.

Exhibiting: Centrifugally cast tubes, a new type of annealing box, furnace rollers, chain, etc.

In attendance: **B. J. Sayles,** president; **Roger Stuart Brown,** vice president; and **Harry Ransom,** sales engineer.

Carborundum Co., Niagara Falls, N. Y.

Exhibiting: A complete exhibit of its principal abrasive and refractory products used in the metal working industries. The most recent models of Carborundum-Hutto honing heads and other special devices. An interesting display of Globar non-metallic heating elements with definite examples of their application to industrial furnaces.

In attendance: **Charles Knupfer,** general sales manager; **F. J. Tone, Jr.,** assistant to general sales manager; **S. F. Courter,** assistant to general sales manager; **H. A. Collinson,** district sales manager, Cleveland; **C. E. Hawke,** sales engineer, refractory

division; **F. A. Fenno,** sales representative, refractory division; **Carl Rogers,** sales engineer, Globar division; and **J. C. Carlin,** manager, Hutto division.

Continental Industrial Engineers, Inc., Chicago.

Exhibiting (in operation): A working model of the Continental patented forced convection heat treating system. This will be made to scale and provided with a glass in one wall so that it will be possible to notice the effect of the circulating air currents.

Another important exhibit will be a fully automatic heat treating unit which will mechanically transfer the articles being heat treated from a preheat position into a salt bath, from the salt bath into the quench bath and then through subsequent operations, returning the articles back to the loading position. This equipment will be complete with electric motor and will be constructed on a small scale, but comparable with a standard unit. The equipment will be in continuous operation, showing the actual mechanical movements involved.

In attendance: The exhibit will be in charge of **R. A. Hastings; W. A. Darrah,** president; **E. B. Jones,** chief engineer; and other members of the organization.

Continental Machine Specialties, Inc., Minneapolis, Minn.

Exhibiting (in operation): 5 models of the "Continental Doall" combination machine for continuous filing and continuous narrow blade precision sawing. 1 shelf with refleeting mirror to exhibit a large number of specimens of unusual jobs done with these machines.

In attendance: **L. A. Wilkie,** president; **O. A. Johnson,** representative; **W. S. Gallagher,** representative; and **W. Conrad,** representative.

Crown Rheostat & Supply Co., Chicago.

Exhibiting (in operation): Plating barrels, polishing lathes, centrifugal dryers, rheostats, chromium anodes, and buffing wheels.

In attendance: **G. A. Spencer,** sales engineer; **G. E. Huenerfauth,** sales engineer; and **F. P. Green,** sales engineer.

Dayton Rogers Manufacturing Co., Minneapolis, Minn.

Exhibiting: Representative group of metal stampings made under our special die stamping process.

In attendance: **F. F. Milligan,** Cleveland factory representative; **R. V. Taylor,** New York factory representative; **A. S. Mill,** Worcester factory representative; **F. C. Miller,** Toledo factory representative; **J. R. Fuller,** Pittsburgh factory representative; and **D. A. Rogers,** Minneapolis factory representative.

A. P. de Sanno & Son, Inc., Philadelphia.

Exhibiting (in operation): Type "G" Radiac cut-off machine; type "J" Radiac cut-off machine; type "F" Radiac cut-off machine.

Above use abrasive cut-off discs for the cutting of metals, fibrous materials, etc.

Abrasive cut-off discs. Two display cases of grinding wheels.

In attendance: **W. C. Haddock, Jr.,** secretary-treasurer; **L. E. Buckingham,** engineering department; **V. Colajezzi,** engineering department; **B. G. Hardy,** engineering department; **J. C. Rinehart,** sales manager, grinding wheel division; and **C. J. Christensen,** Cleveland representative, grinding wheel division.

Despatch Oven Co., Minneapolis, Minn.

Exhibiting (in operation): A new Despatch dense load convected air furnace, gas fired, designed for maximum temperature of 1200 degrees F.

In attendance: **H. L. Grapp,** vice president; **F. H. Faber,** assistant sales manager; **H. V. Schweitzer,** sales engineer; **A. L. Kershaw,** sales engineer; **Gordon Webb,** sales engineer; and **L. R. Nourie,** sales engineer.

Detroit Testing Machine Co., Detroit.

Exhibiting: A complete line of physical testing apparatus including: Direct reading Brinell machine, universal testing machine, ductility testers, etc.

In attendance: **Ralph Campbell,** partner; and **Fred Nass,** partner.

DeWalt Products Corp., Lancaster, Pa.

Exhibiting (in operation): A semi-automatic metal cutting machine, cutting light wall metal tubing to specified lengths, making 20 to 28 cuts per minute. Also a metal cutting machine, cutting ferrous and non-ferrous metal with saw blades and abrasive wheels, cutting wet and dry.

In attendance: **Paul Gardner,** president; **W. R. Stevens,** general manager; **Walter Gardner,** sales engineer; **Charles Seiberling,** test engineer; and **Jack Mann,** district representative.

Joseph Dixon Crucible Co., Jersey City, N. J.

Exhibiting: The latest developments in Dixon stoppers, nozzles and sleeves, particularly for use in melting of alloy steels in electric furnaces, and special steels in steel casting shops.

In attendance: In charge of **R. R. Belleville,** Cleveland representative assisted by **L. F. Bruce** and **C. E. Shoemaker,** Jersey City main office.

Dow Chemical Co., Midland, Mich.

Exhibiting: Various sand and die castings, forgings, rolled sheet, and plate, and extruded sections of Dowmetal magnesium alloys.

In attendance: **W. F. Stumpfig,** advertising manager; **L. B. Grant,** Dowmetal sales manager; **O. E. Grant,** Dowmetal sales; and **W. R. Caple,** Dowmetal sales.

Driver-Harris Co., Harrison, N. J.

Exhibiting: Heat and corrosion resisting alloys such as "Nichrome," Chromax, Cimet; in the form of castings, bars, strip, carburizing containers, sheet containers, enameling racks, normalizing shafts, dipping baskets, lead pots, and diamond dies.

In attendance: **F. V. Lindsey,** vice president; **G. A. Lennox,** assistant general sales manager; **W. E. Blythe,** Detroit district manager; **K. H. Hobbie,** Chicago district manager; **L. V. Prior,** Cleveland district manager; **A. J. Eckley,** sales engineer; and and **R. B. Beatty,** sales engineer.

E. I. du Pont de Nemours & Co., Inc., R. & H. Chemicals Dept., Wilmington, Del.

Exhibiting (in operation): Demonstration of barrel-plating of steel parts, display of case-hardened and heat-treated steel articles.

In attendance: **D. A. Holt,** R & H, Niagara Falls; **Walter Gager,** R & H, Niagara Falls; **F. F. Oplinger,** R & H, Niagara Falls; **Harry Benner,** R & H, Niagara Falls; **C. A. Vincent-Daviss,** R & H, Wilmington; **J. J. Landy,** advertising manager, R & H, Wilmington; **C. Dittmar,** manager, R & H, Cleveland; **C. Hamman,** sales division, R & H, Cleveland; and **J. Christy,** sales division, R & H, Cleveland.

Eclipse Fuel Engineering Co., Rockford, Ill.

Exhibiting (in operation): Heat treating furnaces, recirculating heaters, industrial gas burners including tunnel type, pipe type and other miscellaneous types. Gas injectors, safety gas valves, proportional mixers, temperature control valves, pressure blowers, pressed steel pots, metal melting furnaces, dowtherm boiler.

In attendance: **G. W. McKee,** vice president; **K. A. Scharbau,** treasurer; **D. A. Campbell,** sales engineer; **L. J. Strohmeyer,** sales engineer; **E. A. Stoner,** superintendent; **E. E. Magnuson,** sales engineer; **F. F. Marlowe,** sales engineer; **W. H. Kay,** Northern Ohio representative; **C. C. Carmody,** Western Pennyslvania representative; and **E. H. Seelbach,** Western New York representative.

Electric Furnace Co., Salem, O.

Exhibiting: Enlarged photographs of new developments in controlled atmosphere furnaces for brazing, scale-free heat treating and bright annealing ferrous and non-ferrous metals, including wire, sheet, tubing, strip, stampings, etc. Also, samples of material treated in these furnaces. Photographs of furnaces for normalizing, carburizing, nitriding, forging, annealing and other heat treating processes. Elfurno gas generator for producing the special protective atmosphere needed in bright annealing, scale-free heat treating, and copper brazing furnaces.

In attendance: **R. F. Benzinger,** vice president; **F. T. Cope,** general manager; **A. H. Vaughan,** chief engineer; **T. B. Bechtel,** sales engineer; **C. L. West,** sales engineer; **K. U. Wirtz,** sales engineer; **C. H. Vaughan,** sales engineer; **G. P. Lozier,** superintendent; **S. J. Eberwein,** assistant superintendent; **B. C. Thompson,** Detroit district representative; and **A. E. Wright,** advertising manager.

Electro-Alloys Co., Elyria, O.

Exhibiting (in operation): Thermalloy heat treating equipment and application X-ray inspection.

In attendance: **H. I. Dixon,** metallurgical engineer; **A. M. Miller, Jr.,** district representative; **W. J. Hansen,** district representative; **F. K. Ziegler,** metallurgical engineer; **L. B. Haughwout,** radiographer; **R. L. Denman,** radiographer; **J. W. Henry,** superintendent; and **W. C. Whyte,** vice president.

Ensign-Reynolds, Inc., New York.

Exhibiting (in operation): Immerison soft metal furnace. Rotary type air-cooled gas compressor. High pressure ribbon burners with flame distributor and air cleaner, screen burners, Staylite burners, gas inspirators. Atmospheric burners and inspirators. Centrifugal air blower. Centrifugal gas booster. Soldering furnaces. Swivel burners for tentering frames.

In attendance: **F. J. Fieser,** assistant to vice president; and **N. E. Bertl.**

J. B. Ford Sales Co., Wyandotte, Mich.

Exhibiting: Complete display of Wyandotte specialized metal cleaners for plating, lacquering, enameling, japanning, and vitreous enameling. For use in still solutions, electric cleaning solutions, metal parts washing machines, tumbling barrels, and spray gun equipment. For cleaning before bonderizing, anodizing, hot tinning, galvanizing, and assembling. For removing lacquer, japan, carbonized mineral oils, and fabricating compounds. Wyandotte burnishing compounds for all burnishing problems. Wyandotte neutralizers for neutralizing acid after pickling operations. Wyandotte specialized cleaners for cleaning railway equipment, aeroplane, and automotive equipment.

In attendance: **B. N. Goodell,** manager industrial department; **W. M. Cole,** assistant manager industrial department; **G. T. Robinson,** manager Cleveland office; **L. C. Warden,** industrial department representative, Cleveland territory; and **R. W. Renton,** industrial department representative, Cleveland territory.

Cyril A. Fox, Pittsburgh.

Exhibiting (in operation): New type Fox cut-off machine, used for cutting gates and risers from castings. Cut-off abrasive wheels for use on this machine.

In attendance: **Cyril A. Fox,** president; **O. A. Clark,** sales engineer; and **J. G. Bair,** sales engineer.

Foxboro Co., Foxboro, Mass.

Exhibiting (in operation): Complete line of measurement and control instruments for the metal industries. The potentiometer controller, the potentiometer stabilog with deviation record, the cupola air weight controller, the potentiometer recorder, the temperature stabilog, the pressure stabilog and the pickling tank controller.

In attendance: **A. B. Bates,** manager, Cleveland office; **C. E. Hellenberg; A. H. Shafer; H. L. Lee; S. C. Horn;** and **E. S. Lawson.**

Gas Machinery Co., Cleveland.

Exhibiting (in operation): Rotary forge furnace with water seal and syphon vents wherein stock may be heated under controlled temperatures and atmosphere, which will insure uniformly heated stock being delivered to the forging machine with machine-like precision with practically no scale loss or surface decarburization. Also photographs of recent furnace installations.

In attendance: **W. E. Steinwedell,** president; **L. C. Hamlink,** vice president; **T. F. Schilling,** general manager furnace division; **E. J. Thomas,** chief engineer; **Theo. Schroeder,** engineer; and **C. K. Hamlink.**

General Electric Co., Schenectady, N. Y.

Exhibiting (in operation): An atmosphere-controlled mesh belt brazing furnace. This furnace, which is 30' long, will be in actual operation and the brazing process may be witnessed and the finished parts examined.

A variety of different types of electric welders, including motor generator sets, gasoline driven generator sets and transformers. It will be possible to perform welding with any one of the various welders, and a booth and screen will be provided which will permit several people to witness the welding operation.

In attendance: welding specialists: **O. A. Tilton, L. D. Meeker, C. I. McGuffey, H. P. Doud, W. M. Brady, E. Von Steeg,** and **H. O. Westendarp.** Heating specialists: **H. M. Webber, A. N. Otis, H. M. Chatto, L. B. Rosseau, E. W. Cunningham, H. E. Scarbrough, H. E. Lewis, F. N. Hill,** and **R. F. Newell.**

General Electric X-Ray Corp., Chicago.

Exhibiting: General Electric Hays X-ray spectrograph and General Electric Maximar Oilimerst industrial X-ray apparatus. First showing of this important machine which is completely shock-proof and operates at a capacity of 8 ma. at 200 Kv.p.

In attendance: **E. W. Page,** manager, industrial division; **H. Trenary Anderson** and **R. Dent.**

Grasselli Chemical Co., Inc., Cleveland.

The exhibit will feature two distinct groups of Grasselli Chemicals. The first group will include an actual working demonstration of electroplating with Grasselli "Cadalyte." Souvenirs of the Exposition will be plated at the Grasselli exhibit to illustrate the results obtained with the Grasselli process. Hull and Strausser test equipment will also be on display for determining the thickness of Cadmium and Zinc deposits.

The second distinct group of products will be chemicals for the steel industry, which will include chiefly acids, fluxes and inhibitors. Photographic illustrations and charts will illustrate the use of Grasselli chemicals in the steel industry and the products themselves will be displayed in eight-ounce sample bottles. Samples of iron and steel will be displayed showing pieces with scale and with the scale removed after the pickling operation, using Grasselli acids and inhibitors. Titration test equipment will also be displayed for testing the strength of pickling solutions.

Grob Brothers, West Allis, Wis.

Exhibiting (in operation): Grob modern die making equipment consisting of open end band saws, other metal band saws, continuous-motion filing machines, and Grob saw band brazing device.

In attendance: **Benjamin Grob,** partner; **Theodore Grob,** partner; and **O. P. Brett,** representative.

Handy & Harman, New York.

Exhibiting (in operation): Low temperature brazing alloys and silver solders. Various silver clad metals for constructing corrosion resisting containers and equipment as well as electrical contact metals. Brazing with silver alloys will be demonstrated at two stations, the main station showing oxy-acetylene brazing of both ferrous and non-ferrous metals, the other station being devoted to electrical resistance brazing and dip-brazing. In connection with a background illustrating the main points of advantage our products offer, samples of various types of work will be exhibited. Silver clad metals and silver contact metals will also be displayed.

In attendance: **F. T. Van Syckel, Leo Edelson, John Gunther, Herman Folgner,** and **A. W. Swift.**

Hauck Mfg. Co., Brooklyn, N. Y.

Hauck Venturi high and low pressure oil burners; Hauck Venturi high and low pressure gas burners, and Micro-Regulating valves for oil and gas flow control.

C. I. Hayes, Inc., Providence, R. I.

Exhibiting (in operation): "Certain Curtain" atmosphere controlled furnaces, for heat treatment of high speed, carbon and alloy steel tools; high temperature conveyor type copper brazing furnace; type A-4 high speed steel hardening furnace with atmosphere control attachments, and instruments for recording furnace atmosphere; also external atmosphere generator.

In attendance: **C. I. Hayes,** president; **J. E. Hines,** vice president and sales manager; **C. G. Paulson,** sales engineer; **E. F. Burke,** Cleveland district representative; **C. A. Hooker,** Detroit district representative; **L. C. Loshbough,** Chicago district representative; and **J. E. Figner,** Pittsburgh district representative.

Haynes Stellite Co.

Exhibiting (in operation): A demonstration of a Haynes Stellite J-Metal tool cutting a steel billet, while the tool is continually kept at a red heat by means of an oxy-acetylene flame.

In addition to the "red-hot" demonstration, Haynes Stellite will also exhibit other metal cutting tools of Haynes Stellite J-Metal. Included in these will be milling cutter blades, welded-tip tools, solid tool bits and a number of special tools. Together with these will be shown castings of solid Haynes Stellite, and various parts showing the application of hard-facing with Haynes Stellite. Various corrosion-resistant castings of Hastelloy, the acid-resistant alloy, will also be exhibited.

Hevi Duty Electric Co., Milwaukee.

Exhibiting (in operation): Miscellaneous electric heat treating equipment.

In attendance: **E. L. Smalley,** president; **H. E. Koch,** vice president; **A. H. Oberndorfer,** advertising manager; **L. W. Hayden,** Philadelphia district representative; **J. S. Ayling,** Cleveland district manager; and **L. A. Shea,** Chicago district representative.

Hobart Brothers, Troy, O.

Exhibiting (in operation): The complete line of Hobart "Simplifier," 40-volt arc welders in sizes ranging from 75 to 400 amperes. Arc welding process on both ferrous and non-ferrous metals—light gauge sheet metal and heavy sections—in various applications. Photographs and actual samples of welded parts and assemblies.

In attendance: **E. A. Hobart,** president and chief engineer; **W. H. Hobart,** vice president; **J. T. Wolfenden,** Cleveland distributor; **E. C. Galbreath,** general sales manager; **W. J. Chaffee,** manager welder sales; **E. K. Butterfield,** assistant manager welder sales; **O. H. Menke,** factory manager; **Russel Flora,** designing engineer; and **R. C. Bercaw,** demonstrator.

Charles A. Hones, Inc., Baldwin, N. Y.

Exhibiting (in operation): Gas oven furnaces, high temperature melting furnaces, soft metal furnaces, soldering furnaces, immersion heated tank, industrial gas burners, all requiring no blowers, boosters or power.

In attendance: **C. A. Hones**, president; **W. R. Hones**, vice president; **C. J. Hones**, secretary; **and W. F. De Voe**, sales representative.

Hoskins **Manufacturing Co., Detroit.**
Exhibiting: A comprehensive display of Chromel heating element alloys.
In attendance: **C. S. Kinnison**, advertising manager; **W. D. Little**, sales manager; **W. A. Gatward**, chief engineer; **R. B. Alexander**, furnace engineer; and **J. D. Sterling**, Cleveland district manager.

E. F. Houghton & Co., Philadelphia.
Exhibiting: Improvement in pickling inhibitors will be graphically displayed together with charts showing efficiency of Houghton's inhibitors over extended periods of time. Perliton liquid carburizer, first introduced at the National Metal Exposition in 1934, will also be featured. A wide range of Perlitonized samples will be on display. New drawing compounds which have enabled automotive and other manufacturers to increase greatly the efficiency of their drawing and stamping, will be shown, together with samples of work done by the aid of these materials. An improved series of metal cleaners combining features heretofore not found in the average alkali cleaner, will be announced at this exposition. Recent developments in cutting oil which combine the necessary features of refrigeration, film strength and lubrication will be graphically presented. New wire drawing agents will likewise be shown, with proof of their efficiency. Stay-Put industrial lubricants will be included in the exhibit, as well as Vim Tred leather belting, leather packings and Houghton's No. 2 soluble quenching oil.
In attendance: **G. W. Pressell**, vice president; **G. S. Rogers**, general sales manager; **L. D. Holland**, manager marketing research; **C. G. Schultz**, sales manager, central division; **H. E. Martin**, Detroit district manager; **W. A. Fletcher**, Cleveland district manager; **D. J. Richards**, Pittsburgh district manager; **C. P. Geen**, manager lubrication department; **G. W. Esau**, metal research sales department; **O. M. Gibson**, metal research sales department; and **D. C. Miner**, manager advertising department.

Illinois Testing Laboratories, Inc., Chicago.
Exhibiting (in operation): "Alnor" portable and stationary, single and multi-point indicating pyrometers, distant reading thermometers (resistance type) and air velocity meters.
In attendance: **M. D. Pugh**, sales manager; **E. F. Burke**, Cleveland representative; and **C. A. Hooker**, Detroit representative.

International Nickel Co., Inc., New York.
Exhibiting: Alloys of nickel both ferrous and nonferrous.
In attendance: Members of research and development division; members of monel and rolled nickel department; members of nickel sales department.

Johns-Manville Corp., New York.
Exhibiting: Complete line of insulating and refractory materials, of which the following will be featured:
Sil-O-Cel C-22 brick for use as a combination insulating and refractory lining in furnaces operating at temperatures up to 2000° F.
Sil-O-Cel C-3 concrete, for temperatures up to 1800° F., a semi-refractory insulating concrete lining for furnace doors and for insulating furnace floors and bases.
Firecrete, a hydraulic-setting, monolithic refractory used at temperatures up to 2800° F. for poured door linings, flues and pipes; for dampers and special shapes.
In attendance: **G. E. Grimshaw**, manager industrial insulations department, New York; **J. C. Crawford**, engineer, industrial insulations, New York; and industrial insulation engineers from Cleveland office.

J. W. Kelley Co., Cleveland.
Exhibiting (in operation): Heat treating products, industrial oils, special exhibit of grinding oil.
In attendance: **J. W. Kelley**, president; **A. F. Ruffner**, metallurgist; **Hugh Ferguson**, Detroit representative; **G. A. Rieke**, Chicago representative; **B. O. Platell**, representative; and **V. Kennedy**, representative.

C. M. Kemp Manufacturing Co., Baltimore.
Exhibiting (in operation): Industrial carburetor for premixing air and gas. Demonstration of submerged combustion equipment for pickling tanks. Atmos-gas producer for deoxidized annealing.
In attendance: **E. B. Dunkak**, vice president; **W. S. Bassett**, Chicago district representative; **J. P. Flippen**, Pittsburgh district representative; and **William Hunt**, development engineer.

G. N. Krouse, New Kensington, Pa.
Exhibiting (in operation): Cantilever type high speed fatigue machines testing inexpensive specimens at 100,000 cycles per minute. High speed fatigue machines equipped with a new wire testing attachment having a speed range of from 500 to 12,000 cycles per minute. Sheet fatigue testing machine adapted for range of repeated stress investigations of sheet metals.
In attendance: **G. N. Krouse**, president.

Leeds & Northrup Co., Philadelphia.
Exhibiting (in operation): The complete Micromax family of temperature instruments, consisting of the new silver anniversary strip-chart recording controller, round-chart recorder, indicating contoller, and non-indicating controller. A special demonstration of Micromax electric control will show how temperatures are regulated by proportioning heat-input to demand. Three control systems are available—without droop corrector, with manual droop corrector, or with automatic droop corrector. Each element of the system works with Micromax sensitivity and accuracy.
In attendance: **G. W. Tall, Jr.**, manager industrial sales; **Henry Brewer**, manager market extension division; **A. E. Tarr**, district manager industrial sales, Chicago; **A. F. Moranty**, district manager industrial sales. Cleveland; **J. Korp**, metallurgist; **T. C. Smith**, sales representative; **H. S. Vecella**, sales representative; **G. C. Graf**, sales representative; **J. A. Dufault**, sales representative; and **E. A. Yeo, Jr.**, sales representative.

E. Leitz, Inc., New York.
Exhibiting (in operation): Leitz large micro-metallograph MM-1 for observation of ordinary reflected light, polarized reflected light and dark

field. Leitz simplified micro-metallograph MM-2 with new type mercury vapor illuminator. Leitz dilatometer for the thermal analysis of metals by means of automatically recording. This is the latest model with improved transmission system. Leitz universal microscope and photomicrographic apparatus "Panphot" permitting the use of any type of illumination for micro and macro investigations. Leitz large workshop microscope for testing of smaller machine parts, screw-threads, etc. Guthrie-Leitz automatic polishing machine with mechanical rotation device for the rotation of the specimen, newly developed speed control for AC or DC operation. Leitz Leica camera and accessories. Leitz Tyndallometer for direct measurement of the dust concentration of the atmosphere,—a new instrument in the field of industrial hygiene.

In attendance: **O. F. Soetbeer, P. R. Mayo,** and **W. H. Kessel.**

Lincoln Electric Co., Cleveland.

Exhibiting (in operation): The new dual continuous control introduced on the "Shield-Arc S. A. E." welder. Another recent Lincoln welder development . . . the new "SA-150" . . . will also be demonstrated. This small welder, with a rated capacity of 45 to 200 amperes, is insulated with Class "B" (non-inflammable) insulation, permitting operation at sustained peak loads without danger of burn-outs.

In attendance: **A. F. Davis,** vice president; **C. M. Taylor,** vice president; **Art Madson,** welding instructor; **V. Peters,** welding technician; **E. W. P. Smith,** consulting engineer; **W. S. Stewart,** district manager; **F. W. Kessler; G. A. Sohl;** and **R. E. Haas.**

Lindberg Engineering Co., Chicago.

Exhibiting (in operation): Cyclone furnaces, gas and electric, in operation. Special demonstration of new Lindberg throttling valve. Screw type pot furnace for lead, cyanide, etc.

In attendance: **A. N. Lindberg, L. A. Lindberg, F. A. Hansen, C. H. Stevenson, Harry Munn,** and **Frank Condit.**

Linde Air Products Co., New York.

Exhibiting (in operation): Recent outstanding developments of the oxy-acetylene process, and the advances of machine cutting will be particularly featured. Several of the latest cutting machines will be on view to show how the demands for various applications of flame cutting have been answered with specially designed equipment. The new Oxweld type CM-12 shape cutting machine, which covers a scope of work hitherto impossible with one machine, will be in actual operation.

Several new acetylene generators which have been introduced during the past few months will be shown and a new line of Oxweld oxygen and acetylene regulators will be represented together with the latest in hand cutting and welding blowpipes.

Macklin Co., Jackson, Mich.

Exhibiting (in operation): Display of grinding wheels. Cut-off machine in operation. Enlarged photographs of grinding operations.

In attendance: **T. J. McIntyre,** president; **V. E. Breyley,** sales representative; **H. E. Bosshulte,** sales representative; **M. H. Balz,** sales representative; **T. P. Green,** sales representative; **C. Weintritt,** sales representative; and **J. J. O'Sullivan** sales representative.

Mahr Manufacturing Co., Minneapolis, Minn.

P. R. Mallory & Co., Inc., Indianapolis.

Exhibiting: A display of Mallory metals and alloys —Elkonite, Elkaloy A Metal, Mallory 3 Metal, Mallory 53 Metal, Mallory 100 Metal—and all types of Mallory water-cooled holders. Spot welding tips, seam welding wheels, flash welding dies and various forms of castings, forgings and special shapes. A special display of gun welders equipped with Mallory arms and tips. Examples of spot welding of dissimilar metals and display showing difficult welds. Animated display showing differences in properties of Mallory metals and copper. Exhibit of Mallory electrical contacts and contactors of tungsten and molybdenum, Elkonite, platinum, silver, nickel, copper, or their alloys. Large photographic murals, picturing and describing actual results of Mallory metals on difficult welding operations.

In attendance: **P. R. Mallory,** president; **J. A. Weiger,** vice president; **P. N. Cook,** publicity department; **John D. Tebben,** Detroit district sales manager; and **Lloyd E. Arnold,** Cleveland-Pittsburgh district sales manager.

Manhattan Rubber Manufacturing Division, Passaic, **N. J.**

Exhibiting (in operation): Abrasive cut-off wheels cutting alloy castings. Finishing wheels for stainless steel of a new type, recently developed, which produce a much improved finish.

In attendance: **W. H. Steinberg,** assistant manager; **H. D. Gilbert,** factory representative; **Lamar Hilton,** factory representative; **P. F. Kuzmick,** Cleveland; and **C. A. Fox,** Cleveland.

Metal & Thermit Corp., New York.

Exhibiting (in operation): The complete line of Murex heavy mineral coated electrodes together with a number of test specimens and sample welds made with Murex. A welding booth for demonstrating electrodes. Sample welds and equipment for welding by the Thermit process.

In attendance: **J. H. Deppeler,** chief engineer; **H. T. Thompson,** Pittsburgh manager; **E. E. Radcliffe,** Cleveland representative; **E. J. Knapp,** arc welding engineer; and **M. L. Smith,** advertising manager.

Mullite Refractories Co., Shelton, Conn.

Various types of refractory shapes manufactured from "Shamva" Mullite. A complete "Shamva" Mullite roof for electric steel melting furnaces will be part of the exhibit. This roof will be installed in a Lectromelt furnace and will show how the roof will look in actual service.

Those in attendance at the exhibition will be: **C. W. Fyfe,** General Manager; **G. T. Hubbell,** Sales Manager; **B. Bernbaum,** Salesman; **L. L. Greenfield,** Salesman; **C. E. Stuart,** Salesman.

National Cylinder Gas Co., Chicago.

Exhibiting (in operation): Corta oxy-acetylene cutting machine. An advanced model cutting machine, designed to do all types of cutting, such as straight lines automatically, circles, irregular

shapes of all types and kinds, either manually by following the lines of a drawing, or automatically with the use of a template.

In attendance: **R. J. Hurt**, district manager; **A. C. Arnold, B. M. Kimball, J. L. Colopy**, and **M. E. Fassnacht.**

New Jersey Zinc Co., New York.

Exhibiting (in operation): The wide use of zinc alloy die castings in modern product manufacture. Many completely assembled articles, ranging from household equipment to industrial machinery, will be on exhibit together with their component die castings. Ranging in size from the modern automobile radiator grilles down to the chain ring bracket on a watch, these exhibits tell a startling story of the development of the use of zinc alloys. Many examples of plating, lacquering and enameling will illustrate the possibilities of finishing these articles.

In attendance: **A. E. Mervine**, manager metal division; **W. P. Hardenbergh, Jr.**, assistant manager metal division; **A. F. Bremble**, metal division; **W. W. Broughton**, technical service division; **S. E. Maxon**, technical service division; **D. P. Brannin**, manager, Chicago office; **R. Davison**, manager market development division; **C. R. Maxon**, market development division; **E. K. Vaughan**, market development division; **R. E. Kellers**, market development division; and **R. L. Davis**, market development division.

Nickel & Chromium Product Co., New York.

Exhibiting (in operation): Complete installation of portable plating with demonstration.

In attendance: **Harry H. Stockfeld**, president with assistants.

North American Mfg. Co., Cleveland.

Exhibiting (in operation): A newly developed luminous flame burner in the American Gas Association section of the show. This burner will be in operation in a scale model sheet furnace. The furnace will be arranged and constructed in such a way that the character of flame produced by the luminous burner can readily be observed. Also in operation will be a North American Gas-Air proportioning valve, controlling the luminous burner, and a turbo blower supplying air to the burner.

In booth M-45. A complete line of industrial gas burning equipment including a luminous flame burner, pressure burners, tunnel burners, venturi mixers, high pressure inspirators, gas-air proportioning valves, oil-air proportioning valves, blowers, and other smaller items of industrial gas burning equipment.

In attendance: **G. F. Naab**, vice president, general manager; **Z. D. Basset**, secretary; **O. C. Bernhard**, vice president; **C. E. Sladky**, salesman; **S. E Shepard**, salesman; **G. E. Markley**, salesman; **H. C. Beik**, salesman; **M. S. Baskin**, salesman; **G. C. Davis**, salesman; **N. H. Davies**, salesman; and **H. G. Hoss**, salesman.

Norton Company, Worcester, Mass.

Exhibiting (in operation): Alundum and crystolon general purpose grinding wheels, alundum tool grinding wheels, oilstones, mounted points, alundum and crystolon bricks and sticks, Norton diamond wheels, Norbide products, Norton refractories.

In attendance: **C. W. Jinnette**, regional manager, sales planning and development; **G. A. Park**, district manager, Ohio territory; **I. W. Stanton**, publicity department, exhibit section; **W. R. Moore**, sales manager, Worcester, Mass.; **H. K. Clark**, general sales manager, Worcester, Mass.; **W. T. Montague**, manager, sales planning and development, Worcester, Mass.; **W. D. Bennett, G. W. Nelson, R. H. Cannon, F. P. Hays, Jr.**, and **H. A. Blackburn.**

Tinius Olsen Testing Machine Co, Philadelphia.

Exhibiting (in operation): One 60,000 pound capacity universal all-hydraulic loading and weighing testing machine having three hydraulic dial indicators. One 20,000 pound capacity pendulum weighing mechanical operating machine with gear box drive, provided with our latest high magnification electric elongation recorder. Strain gauge. Verifying ring. Adjustable extensometer. Direct motor driven Brinell hardness tester. Stiffness testing machine for testing the stiffness of sheet metal and wire. Filament stiffness testing machine for light stock provided with impact test attachments. Universal impact testing machine. Balancing machine for balancing rotating parts. Our new high magnification electric recorder which will be demonstrated in connection with our 20,000 pound capacity universal testing machine, which will be the first public demonstration of our new electronic recorder.

In attendance: **B. L. Lewis, T. L. Richards**, and **G. C. Lawrie.**

Pangborn Corp., Hagerstown, Maryland.

Exhibiting: Photographs representing complete line of Pangborn blast cleaning and dust collecting equipment, including Rotoblast centrifugal units, also some blast cleaning units on display. Complete line of blast cleaning accessories including hose, helmets and "certified" steel abrasives.

In attendance: **P. J. Potter**, vice president; **V. F. Stine**, 2nd vice president and sales manager; and **R. E. Donnelly**, district sales engineer.

Park Chemical Co., Detroit.

Exhibiting: A display of hardening and heat treating materials, liquid carburizers, buffing and polishing materials.

In attendance: **J. N. Bourg**, vice president and general manager; **F. W. Faery, Jr.**, salesman; and **J. C. Thompson**, salesman.

Parker-Kalon Corp., New York.

Exhibiting (in operation): Complete line hardened self-tapping screws, hardened masonry nails and screwnails and the cold-forged line including wing nuts, cap nuts and thumb screws. Demonstrations will be made and tests conducted on the holding power of these products versus devices they intend to replace under tension and shear stresses; specially designed testing equipment being used for this purpose.

There will also be exhibited for the first time a product of the Parker-Kalon laboratory known as the micro-comparator—a device for measuring

by mechanical means variations in planed surfaces of one-ten millionth of an inch. Likewise, Parker-Kalon gauge blocks, another product of the laboratory, will be shown.

In attendance: **C. S. Trott,** director of sales; and **J. E. Borchard,** sales engineer.

Partlow Corp., New Hartford, N. Y.

Exhibiting (in operation): Temperature controls, for both gas and electric, limit controls, dial thermometers, safety gas valves, safety pilots.

These safety pilots are something entirely new. In case of gas failure, pilot failure or electric failure, the entire gas supply will be shut off instantly.

In attendance: **H. W. Partlow,** president; **H. W. Partlow, Jr.,** vice president; and **A. M. Stock,** vice president.

Philadelphia Drying Machinery Co., Philadelphia.

Exhibiting: Photographs of new developments in furnaces for various heating applications, including annealing, carburizing, forging, hardening, tempering, melting, calcining, frit smelting, also core baking, convection annealing, glass annealing, direct and indirect fired. Complete display of oil burners, ranging in size from ½" to 4", with oil capacities from 1/10 gallon per hour to 55 gallons per hour, also three types of gas burners, of the proportional mixing type, low pressure velocity type and atmospheric type.

In attendance: **W. W. Sibson, Jr.,** engineer; **A. H. Kruger,** sales engineer; and **D. E. Wyman,** chief engineer, industrial furnace division.

Pittsburgh Instrument & Machine Co., Pittsburgh.

Exhibiting (in operation): Diamo-Brinell testing machine with diamond indenter, power-operated Brinell machine, hand-operated Brinell machine, Brinell microscopes, direct-reading Brinell instrument, depth indicator for Brinell tests, Brinell calibrator for checking Brinell machines.

In attendance: **Walter Kammerer** and **Albert Trueg.**

Production Machine Co., Greenfield, Mass.

Exhibiting (in operation): Production type No. 101 patent centerless belt feed polishing, finishing and buffing machine for tube, rod, and bar work. Type "S" production centerless polishing and finishing machine. Production type No. 1 9" vertical machine. Production type No. 6 9" horizontal machine. Production type No. 601 4" bench handy speed finisher. Production type No. 606 6" bench surfacer.

In attendance: **W. S. Howe,** president; **A. H. Behnke,** vice president; **T. A. Welch,** superintendent; and **C. K. Worthen,** sales engineer.

Pyrometer Service & Supply Corp., Cleveland.

Exhibiting: A display emphasizing our facilities as high temperature engineers, including such accessories as thermocouples, protecting tubes, insulators, lead wire, Gordon therocouple heads, and samples of repaired instruments.

Quigley Co., Inc., New York.

Refractories.

Riehle Division, American Machine and Metals Mfg. Corp., New York.

60,000# Universal Precision Hydraulic Testing machine in operation, as a representative type of this kind of equipment. Also the Riehle-Mann Variable Speed Impact Testing machine, capable of testing up to speeds of 500 ft. per second. This is the new development worked out at the Watertown Arsenal in Watertown, Mass., by Dr. Mann and Captain Haskell, the paper concerning which Dr. Mann received the Dudley Medal of the A. S. T. M. Also exhibiting other types of equiment representative of our line of over one thousand different instruments and apparatus used in the field of physical testing.

Safety Gas Lighter Co., Lynn, Mass.

Exhibiting (in operation): Improved round file gas lighters (for welders' use and household appliances)—gas ranges, hot water heaters, etc. "Popular" and "Pyro" hand gas lighters. Stationary ignition equipment for all types gas installations. Regulator clamps for laboratory and surgical equipment. Exhibit showing origin and development of gas lighters from inception in 1901 to present day.

In attendance: **K. P. Hill,** vice president; and **W. T. McNally,** field representative.

Salem Engineering Co., Salem, Ohio.

Exhibiting: Photographs and illustrations of modern furnace design.

In attendance: **S. F. Keener,** president; **J. W. Wagoner,** general manager; **N. H. Knowlton,** sales representative; **R. R. Lapelle,** sales representative; **R. M. Atwater,** sales representative; **Allen T. Greiner,** Canadian resident manager; **W. K. Leach,** sales representative; **F. E. Myers,** purchasing agent; **R. E. Buckholdt,** chief draftsman; **J. H. Loux,** electrical engineer; **J. W. Hays, R. E. Cuthbert, H. E. Vogeli,** and **C. R. Watters.**

Selas Co., Philadelphia.

Burners; soldering systems.

Spencer Turbine Co, Hartford, Conn.

Exhibiting (in operation): Centrifugal type Turbo compressors used for operating gas and oil-fired furnaces and industrial type vacuum cleaning. A slow speed multi-stage centrifugal type Turbo compressor supplying air for the gas furnaces operating during the exhibit. Smallest size "Midget" and also machine made up with special metal for use in handling corrosive acid fumes. The industrial type vacuum cleaner operating to show the effectiveness of cleaning in industrial plants, and handling large accumulations of litter.

In attendance: **F. A. Wright,** special representative; **Charles Gardiner,** district representative; **R. B. Richardson,** district representative; and **R. A. Brackett,** sales manager.

Steel City Testing Laboratory, Detroit.

Several of the latest developments in Brinell Testing Machines. Also exhibit tensile testing machines of the MP-10 and UMH-45 Models, but both will be motor driven instead of hand operated. A tensile testing machine, especially for testing wire, will be exhibited. Also our Type P-2 and P-3 Ductility Testing Machines for testing the drawing qualities of sheet metal. In addition to this, miscellaneous equipment such as portable Hardness Testing Hammer, Transverse Testing Machine, Proving Instrument, etc.

D. A. **Stuart Oil Co., Chicago.**

Exhibiting (in operation): A full line of carefully manufactured Extreme Pressure (EP) industrial oils and greases, and will demonstrate the difference between EP and non-EP lubricants to visitors interested in the subject by means of one or more of the better known EP lubricant testing machines. In addition, "Third-Kut" oil as recommended by practically all machine tool builders as a modern tool lubricant for production, tool room, or plant maintenance requirements; Stuart's "Codol" liquid grinding compound, a comparatively new development in soluble grinding and cutting oil; Stuart's "Super-Kool" drawing lubricants (for stainless steel); as well as sample parts machined with these well-known lubricants.

In attendance: **W. H. Oldacre,** vice president; **T. B. Langdon,** vice president; **W. H. Huelster,** western sales manager; **W. M. Duncan,** engineering department; **C. H. Baker,** Ohio representative; **B. W. Deacon,** Michigan representative; **C. J. Nagel,** western New York representative; **A. J. McDuff,** New England representative; **T. C. Bradford,** New England representative; and **J. Y. Umbarger,** Pennsylvania representative.

Surface Combustion Corp., Toledo.

Exhibiting (in operation): SC gas-fired radiant tubes with glass inserted so that the public can see the interior very easily. Also an SC high speed furnace and an SC air heater. Tables and display easels showing samples of various metal products which have been heat treated with SC equipment.

In attendance: **F. H. Adams,** vice president and general manager; **W. M. Hepburn,** vice president and chief engineer; **C. B. Phillips,** vice president and general sales manager; **G. R. McDermott,** vice president Chapman Stein division; **H. M. Heyn,** sales manager heat treat division; **A. L. Hollinger,** sales manager steel mill division; **E. W. Weaver,** assistant chief engineer; **E. G. deCoriolis,** research director; **R. J. Cowan,** metallurgist; **R. F. Cochran,** metallurgist; **F. J. Winder,** sales engineer; **W. O. Owen,** Chicago office manager; **H. J. Gregg,** sales engineer; **W. F. Herdrich,** Detroit office manager; **E. Stephenson,** sales engineer; **J. M. Brown,** sales engineer; **T. F. Loughry,** New York office manager; **F. C. Starr,** Philadelphia office manager; **A. H. Koch,** sales engineer; and **G. D. Mantle,** Pittsburgh office manager.

C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y.

Exhibiting (in operation): The complete line of Tag photoelectrically balanced potentiometer pyrometers, featuring simplification of design and several new models and improved details of construction will be exhibited,—for example, a new pen with ink capacity enabling it to write a record line one mile long. A display of the latest developments in modern pressure spring instrumentation.

Magnetic clutch flow instruments will also be displayed.

In addition Tag industrial thermometers, Tag chemical thermometers, Tag hydrometers and oil testing instruments will be prominently shown.

In attendance: **W. C. Bennett,** general sales manager—**eastern** division; **E. D. Wacker,** general sales manager—**western** division; **C. O. Fairchild,** director of research; **William Printz,** division sales manager; **A. R. Anderson,** Cleveland office; **F. L. Frock,** Cleveland office; **C. L. Huffman,** Pittsburgh office; and **J. S. Pendleton,** Pittsburgh office.

Titanium Alloy Manufacturing Co., Niagara Falls, N. Y.

Exhibiting: Examples of titanium treated steels, cast iron, aluminum, etc.

In attendance: **W. G. Wellings,** chief development engineer; **E. R. Starkweather,** development engineer; **S. T. Harleman,** development engineer; **E. L. Lasier,** vice president; **G. F. Comstock,** metallurgist; **D. A. Thompson,** sales and development; **R. E. Mullady,** development engineer; R. R. Pratt, superintendent, and **E. L. Lasier,** vice president.

Una Welding, Inc., Cleveland.

Exhibiting (in operation): A full automatic Una electric arc welding head and Una-taper demonstrating a practical method of automatic welding with complete protection of weld metal. The necessary quantity of coating to give protected arc quality metal being supplied by a combination of coating on the rod and on tape which is wrapped around the rod by the Una-taper as the rod approaches the arc. Practical demonstrations using the 36 Una rods of all types including a complete line of protected arc rods, high speed production rods, rods for maintenance use and general purpose rods. Una welders for automatic and manual welding.

In attendance: **N. T. Jones,** vice president and general manager; **E. W. Kronbach,** treasurer; **E. D. Moore,** chief engineer; **H. C. Bereit,** assistant chief engineer; **J. S. Vogler,** sales engineer; **C. M. Schaub,** sales engineer; **J. B. Austin,** research engineer; **W. G. Hall,** development engineer; **J. Skurhovec,** engineer; **H. P. Blum,** district sales representative; **J. E. Jones,** sales representative; **N. M. Jones, Jr.,** sales representative and **L. W. Jones,** sales representative.

Wells Manufacturing Corp., Three Rivers, Mich.

Exhibiting (in operation): Wells metal cutting band saws; No. 8 capacity—8" diameter, 8" x 16" flat; No. 5 capacity—5" diameter, 5" x 10" flat; horizontal band saws; direct driven and portable; simple in construction and operation; rapid and accurate cutting; gravity feed; no coolant; and automatic stop.

In attendance: **O. R. Ash,** vice president; **A. E. Armstrong,** president; and **W. F. Wells,** factory superintendent.

Wheelco Instruments Co., Chicago.

Exhibiting (in operation): Production samples of all our standard instruments. An enlarged working model demonstrating the "No Contact Principle of Control." A working model demonstrating the "Flame-otrol" showing the electrical conductivity of an ordinary gas flame. A working model of a water level control employing the no contact principle. A Wheelco no contact temperature control actually controlling a small furnace—showing a record of the control curve.

In attendance: **L. W. Wheeler,** president; **T. A. Cohen,** chief engineer; **R. A. Schoenfeld,** sales manager; **G. W. Keller,** eastern division sales manager; **J. S. Ayling,** Cleveland representative; and **C. P. Critzer,** Cleveland representative.

Williams & Co., Inc., Cleveland.

Exhibiting (in operation): Nickel, aluminum, brass and copper, welding electrodes, welding machines, boiler tubes and head and eye protection. In addition, there will be an operating demonstration of arc welding of our many types of welding rod for special purposes.

In attendance: **J. H. Penske, Jr.**, district manager; **N. J. Carbis; H. F. Roberts**, nickel iron specialist; **J. E. Wolcott**, welding specialist; **A. M. Turner, D. J. Connelly, H. D. Lucas**, and **D. A. Cameron.**

Wilson Mechanical Instrument Co., Inc., New York.

Exhibiting (in operation): "Rockwell" hardness tester. "Rockwell" superficial hardness tester. "Rockwell" hardness tester, with gooseneck for testing inner surfaces of tubes or rings. Work support accessories, spares and renewals for "Rockwell" tester.

In attendance: **V. E. Lysaght**, sales manager; **J. P. Roberts**, Cleveland representative; **Paul Fee**, Chicago representative; **C. W. Smith**, Detroit representative; **D. F. Sklar**, New York-Philadelphia representative; and **H. C. Upton, Canadian Fairbanks-Morse Co., Ltd.**, Canadian representative.

Wilson Welder & Metals, Inc., North Bergen, N. J.

Carl Zeiss, Inc., New York.

Exhibiting (in operation): Microscopes and accessories for the examination of metals and photomicrographic apparatus for routine work as well as for the most exacting research laboratory. Particular attention is called to the Neophot and Metalliput Metallographs, both equipped for light field, dark brown and polarized light, requiring no special adjustment. For spectrum analysis of all kinds of material, showing for the first time in this country the new Spectrograph Qu 24, the latest development in spectrum cameras, requiring no adjustments whatsoever.

In attendance: **Erich Friedrich, W. G. Kramer**, and **Eric Sobotka.**

Manganese Bronze Castings

Q.—We have been having some trouble with our Manganese Bronze in regard to tensile strength. I have had samples analyzed for chemical properties and the results are surprisingly close regardless of tensile strength as the tensile strength of some samples were very good and others very low. We are led to believe that a great part of our trouble lies in our heats.

We would appreciate it very much if you would give us information regarding the proper heat for melting and pouring this metal and any other information which would be of benefit to us as regarding mould conditions etc.

Would you consider the following a proper weighing mixture for this metal: Copper 56%; Zinc Dross 42%; Aluminum 1%; Manganese Copper .5%; Ferromanganese .5%.

A.—A good grade of manganese may be made by the use of zinc dross which will compare quite favorably with the grades of this alloy made from new metal, the only advantage being zinc dross is cheaper than good zinc.

Manganese bronze is a difficult alloy to make and the mixture is susceptible to a slight increase or decrease of the ingredients, so that extraordinary care must be exercised in order that the exact proportions shall enter the alloy. There are many instances, however, in which strong alloy is needed and the requirements are not severe. A metal made from zinc dross will answer.

There are two objections to this method of making manganese bronze with zinc dross. First, varying quantity of iron in the dross; second, the presence of lead in it. It is well known that in order to make good manganese bronze, zinc as free as possible from lead should be used. In galvanizing, an ordinary spelter is generally employed and this is apt to contain more lead than would be tolerated in good manganese bronze. On the other hand, makers of best grade of galvanized sheet and wire use a good zinc—in fact, the best grade of zinc in order to allow the bending of the iron without cracking. If dross of such work can be obtained, excellent manganese bronze can be made from zinc dross.

The pouring temperature, while important, is not your trouble. If you pour your manganese bronze so the metal will flare when you push back the metal, you will find this more accurate than using a pyrometer. The correct pouring temperature on manganese bronze varies with the class of work, generally between 1700 degrees F. and 1950.

We suggest that you try the following:

No. 1 Mixture

Make a hardener of:

Wrought iron	18 lbs.
Ferro manganese	4 lbs.
Tin	10 lbs.

Melt and pour in ingots and use as follows:

Ingot copper	56 lbs.
High grade zinc	43 lbs.
Hardener	2 lbs.
Aluminum	½ lb.

Get the copper good and hot. Add the hardener, stir and then add the zinc, then the aluminum; stir and pour.

No. 2 Mixture

This No. 2 mixture will give you over 60,000 tensile, and 30,000 elastic limit with 20% elongation. Copper 58½ lbs.; zinc 41 lbs.; aluminum ½ lb.

We believe your zinc dross is not uniform and of the best grade. No. 1 mixture should give you excellent results—75,000 tensile.

—W. J. Reardon.

New Metals and Alloys Applicable to the Chemical Industry

Abstracts of Papers on Non-Ferrous Metals Presented at a Symposium of the American Technical Society in Pittsburgh, Pa., September 7-11, 1936.

"Nickel and Nickel Alloys" by Robert J. McKay, The International Nickel Company, New York.

The paper as a whole is an outline of the most useful developments in nickel alloys during the last few years rather than an exhaustive list of properties. The outline is built on a foundation of quantitative information.

A general picture of the properties and corrosion resistance of commercially pure nickel is given, with references to detailed figures. These properties of nickel serve as a basis for the discussion of the newer alloys of nickel which makes up the body of the paper.

The service properties of the alloys, Monel Metal, including high strength Monel Metal, hard cast Monel Metal, and machining quality Monel Metal, the copper-nickel alloys and nickel silvers, Inconel, nickel-clad steel, nickel electroplate, nickel and alloy welding rods, and nickel cast iron are outlined. The variation in physical properties and the abilities and limits of corrosion resistance of these alloys are drawn in general terms by the use of comparative statements.

"Developments in Wrought Copper Base Alloys" by D. K. Crampton, Chase Brass & Copper Company, Waterbury, Conn.

The first part of the paper will be devoted to some of the newer applications of the established alloys. Copper tubes are being increasingly used for all water supplies, for pulp lines in the paper industry, for air lines, oil supply lines, vapor lines, etc. Red brass is the preferred material from the corrosion standpoint for most corrosive waters. In the condenser tube field the cupro nickels are gaining ground. The silicon bronzes are being increasingly applied in many diverse fields, as for instance, tanks, kettles, evaporators, bolts, springs, agitators, etc. One of the latest applications in the paper industry is for Fourdrinier wire.

Some of the newer alloys comprise aluminum brass for condenser use and particularly the recent modification containing both tin and aluminum. Another interesting new development is the use of antimony in many brasses to prevent dezincification. An alloy of great promise is nickel aluminum bronze of rather high nickel and aluminum content. In the welding field coated rod for metallic arc welding and non-fuming brazing rod are important accessories to fabrication of chemical equipment. A very recent development is that of composite tubes for withstanding serious corrosion occurring in oil refinery tubes.

While not an alloy development, the use of copper sulphate as a fertilizer is new and of great practical importance in the chemical and agricultural fields.

"Aluminum and Aluminum Alloys for Chemical Apparatus" by Wm. L. Fink, Aluminum Company of America, New Kensington, Pa.

Aluminum and some of its alloys are advantageously used for the construction of apparatus to handle a wide variety of materials which are relatively inert toward aluminum or may be suitably inhibited. Low density, high thermal and electrical conductivity, high ductility and the colorless non-toxic nature of its salts are among the properties which dictate the selection of aluminum for applications such as are illustrated in this paper. A number of alloys are available, including an Alclad material resistant to perforation by corrosive liquids and, therefore, probably destined to extensive use. Although certain principles are recognized for selecting the proper alloy, it is usually advisable in the case of new applications to test the selected alloy under actual working conditions before constructing the apparatus. The use of copper, brass, and other heavy metals in the same system with aluminum frequently produces serious electrolytic corrosion either directly or indirectly.

"Lead and Lead Alloys" by G. O. Hiers, National Lead Company, New York.

Lead is prominently used in the heavy chemical industry and other lines. When alloyed with a few hundredths per cent tellurium it meets drastic conditions successfully. Improved mechanical properties augment good corrosion resistance producing a superior material of construction. Lead alloyed with up to 28% antimony (commonly with about 6%) is used in appreciable quantities principally on account of physical properties. A lead alloy containing 1% silver and another with 7% tin are used for special purposes.

Pure tin is used with chemicals because of its corrosion resistance and non-toxic nature. Zinc-coated metals and die casting alloys are used despite somewhat limited corrosion resistance.

"Silver and Precious Metals" by James A. Lee, Chemical and Metallurgical Engineering, New York.

Silver has been used to a limited extent for chemical equipment for many years, but recent economic changes have broadened its use in the industry. Silver equipment is generally made entirely of the one metal. Fine silver (999 fine) is preferred; sterling and coin silver are not so resistant although their strength is greater. The initial cost of this type of equipment is high because of the large quantity of metal involved, but much of it may be salvaged when the vessel is scrapped.

Several of the previous metals such as platinum, gold, palladium and tantalum are utilized for construction but, of course, in contrast to the lower cost materials, they are to be found in relatively small quantities and only in vital spots and for extreme conditions. They have an immensely important role, however, in the places where they are employed.

"Determination of the Eutectic in the Indium-Gallium System" by Sidney J. French and Donald J. Saunders, Colgate University, Hamilton, New York.

No work has been previously reported on alloy systems of gallium and indium.

In the present work the temperatures of the alloys were measured by means of a sensitive iron-constantan thermocouple. These temperatures were plotted against those of the bath giving a straight line except during phase changes of the alloys.

0.94 grams of gallium were used to which were added successive increments of indium giving alloys containing from one to 27.7 per cent indium. Because of supercooling, melting curves instead of cooling curves were used.

Solid solutions if formed at all contained less than two per cent indium.

The two metals form a simple binary eutectic alloy melting at 16°C. containing 23-25 per cent indium.

The slopes of the melting curves of the proeutectic alloys gave a method for determining the eutectic range. This value checked with those obtained by direct observation. Alloys containing 21.7 and 27.7 per cent indium bracketed the eutectic range, while alloys containing 23.5 and 24.8 per cent indium gave curves typical of eutectic alloys.

Hot Tinning

By WALLACE IMHOFF

Consulting Engineer, Vineland, N. J.

Hot Tinning Tableware

Q.—For a long time I have been interested in the work of replating tableware by a method known as the dipping process, which consists of first making the ware chemically clean, then placing them in what is called the adhere dip—which is nothing more than soldering acid, made by cutting all the sheet zinc that it is possible in muriatic acid, then dipping into melted metal, then slowly into cold water.

But it does not always work. The goods come out rough and dull, and have small lumps on the tips where the metal runs.

A.—The pieces must first be put through a good commercial cleaning bath. The temperature of the cleaning bath is held at about 200 deg. F., and when the work is absolutely clean, it is removed and thoroughly rinsed in a hot water rinse at 200° F.

The next step is pickling which can be done in a muriatic acid solution. The strength can be tried at about 4% to start with; if too strong, try 2%; and if too weak, make it stronger. The strength will of course depend upon the condition of the work to be replated. A light solution will be all right if the articles are not rusted; if rusted, they will require a stronger solution. The pickle can be used cold or hot; if not enough action cold, then it can be heated to 100°-120° F. After pickling the work should be washed thoroughly and then dipped in a solution of Grasselli tinning flux; then drained well and laid in a warm place to slowly dry. If the articles are drained well it is not necessary to dry them as they can be put into the tin bath very slowly without spattering and throwing the tin.

Tin melts at 450 deg. F. and it should be possible to get a good bright coat at 480 to 500 deg. F. If the work is not bright enough or smooth enough, raise the temperature to about 520 deg. F. Use good Straits tin in the bath and see that the tin is always clean and is never burned or overheated. After the articles have been coated thoroughly, they are slowly withdrawn from the tin bath, allowing them to drain well, and turning so that the metal will run back over the piece and not make any lumps, run-off, or extra heavy coating spots. Then they are plunged into a kerosene oil bath, quenched in a running water jacketed tank. From here they are put in a sawdust box to dry up the oil, and then wiped clean with a soft smooth cloth.

Tinning Milk Cans

A method and one which may be considered to be practical for a small layout, and inexpensive operation is that of not taking the can apart but carefully doing the best job possible under the circumstances of tinning the can assembled.

First the cans **must** be put through a commercial cleaning solution to remove all the butter fats, etc., that may lodge in the seams, etc. It should be kept at about 200 deg. F. After the can is absolutely clean, it is next washed thoroughly in a water tank. This removes the alkali from the cleaner, and washes out the greases and fats removed. If the can is rusted, or has places or spots on it that are rusted, these must be entirely pickled off in a solution of muriatic acid. The strength of the acid will depend upon the character of the rust. A light rust can be removed with a 2% solution at about 120 deg. F., a heavy rust may require a 4% solution at about 120 to 140 deg. F. The light rust may perhaps be removed in a cold solution; the acids should be used cold if possible. If this will not remove the rust, then they will have to be heated. When the rust and all oxide have been entirely removed, the cans are put in a liquid flux solution of zinc ammonium chloride solution. They are then drained well and very slowly immersed in the tin bath, which has about ¼ to ½ inch Grasselli tinning flux on it. The melting point of tin is 449 deg. F. and the bath should be kept only shortly above the melting point, 500 to 475 deg. F. If two pots are used, the first bath may be at 550 deg. F. and the finishing bath at 500 to 475 deg. F. The cans after coming from the tin bath are dipped into a large bath of heated fuel oil. This sets the coating and prevents oxidation and discoloration of the coating. From the fuel bath, they are taken to a wiping bench where they are first wiped with cedar sawdust, then with whiting, then with pine sawdust and finally are wiped with a clean soft rag. If the coating becomes tarnished by handling, it may be cleaned with gasoline and whiting.

British Institute of Metals Meeting

Abstracts of Papers on Fluxes, Platinum, Aluminum and its Alloys and Crystal Structure.

BELOW are abstracts of the papers read at the Paris Meeting of The Institute of Metals of Great Britain, held September 14-18th.

FLUXES FOR USE IN SOFT-SOLDERING

By J. W. Willstrop, A. J. Sidery and H. Sutton

An examination was made of the soft-soldering of materials that are not easily soldered with the aid of the usual fluxes, particular attention being devoted to the soldering of corrosion-resisting steel and to the corrosive effects of flux residues. The features of ortho-phosphoric acid as a flux and the properties of fluxes containing organic phosphates as the active agent were investigated. Fluxes based on organic phosphates permit easy soldering of many materials without residues of the fluxes causing corrosion. The fluxes may be used satisfactorily on corrosion-resisting steels and other materials not readily soldered with the use of fluxes containing zinc chloride as the active constituent.

METALS OF THE PLATINUM GROUP

Ores, Recovery and Refining, Fabrication and Uses, and Properties.

By R. H. Atkinson and A. R. Raper.

An attempt is made to present up-to-date metallurgical information about the six metals of the platinum group. After a brief description of the discovery of the metals and an account of the ores, particular attention is devoted to the recovery and refining of the metals produced from the Canadian nickel industry. This is followed by a full description of the methods of fabrication of the metals and their alloys. It is shown that the two ductile metals of the group platinum and palladium are readily worked, while rhodium and iridium are worked with much greater difficulty. The two metals osmium and ruthenium, belonging to the hexagonal system, have not up to the present been thoroughly investigated. Finally, an account is given of the properties of the metals and their uses.

A NOTE ON THE INFLUENCE OF SALT-BATH HEAT-TREATMENT ON THE CORROSION-RESISTANCE OF DURALUMIN SHEET

By A. J. Sidery and B. Evans

Some experiments were carried out to provide information as to whether the use of a nitrate salt-bath as the medium in the final heat-treatment of Duralumin has any deleterious effect on the corrosion-resistance of the material as compared with that of material which has been heat-treated in an electric furnace. Further, the influence of salt residues on the surface of the sheet during storage was investigated.

It was found that the use of nitrate salt-baths in the heat-treatment operation has no deleterious effect on the corrosion-resistance of Duralumin, but that salt residues are liable to foster local surface pitting of the material during storage.

THE CONDUCTIVITY OF SUPER-PURITY ALUMINUM: THE INFLUENCE OF SMALL METALLIC ADDITIONS

By Gaston G. Gauthier

This paper deals with the effects on the conductivity of super-purity aluminum (exceeding 99·99 per cent) of additions of those elements which may occur as impurities in commercial aluminium.

It is shown that aluminum follows the universal law that the conductivity and the temperature coefficient of conductivity both increase with the purity: Mathiessen's Law has been confirmed. The data presented in this paper on the effect of small additions on the conductivity of aluminium are of value in that they have been determined under favorable experimental conditions, owing to the extreme purity of the basis metal and the large amount which has been available. This high purity has made it possible to determine, with a stated accuracy, the effect of each one of the added elements in the almost complete absence of other impurities. Further, the figures given for iron and silicon, for these elements with titanium and vanadium, and for magnesium and silicon, make it possible to calculate the conductivity of aluminium of accurately known purity.

Norbury's Law does not appear to hold in the case of aluminum.

MECHANICAL PROPERTIES OF ALUMINIUM AND ITS ALLOYS AFTER PROLONGED HEATING.

By A. von Zeerleder and R. Irmann

The strength of pure aluminum and various aluminium alloys has been investigated after heating for long periods at 75°-300° C. The strength properties of the same materials were determined also in the state of complete stabilization. The heating periods employed extended over approximately 2 years. After treatments of different duration at elevated temperatures, some specimens were cooled and tested at room temperature; others were tested at the treatment temperature. For complete softening at 250° C., for instance, **i.e.**, to obtain the properties observed in completely stabilized samples, heating periods of at least 6 months are required in the case of pure aluminium and Anticorodal, and of more than 2 years for Avional and "Y" alloy. A still longer heating time is necessary in the case of the alloy "R.R. 59."

To determine the decrease in strength of any material after heating for long periods at elevated temperatures it is necessary, therefore, to carry out tests of long duration.

The values of the yield-point observed in the normal short time test after heating periods of 1 year form a basis for calculations for engineers. The permissible loads can be ascertained only by observation of the creep limit, and this property is being studied by the authors.

AN ANODIC TREATMENT FOR THE PRODUCTION OF ALUMINIUM REFLECTORS

By N. D. Pullen, N. D.

A description is given of a dual anodic process designed for the treatment of aluminum surfaces in order to produce a high degree of reflectivity. The first bath in which the electrolytic brightening is produced is a mixture of sodium carbonate and sodium phosphate in the approximate proportions of 3:1 having a strongly alkaline reaction. The second bath in which a reinforcing film is produced consists preferably of a strong solution of acid sodium sulphate. Data are given showing the reflectivity of aluminium surfaces treated by this method compared with a standard silver mirror and other surfaces such as chromium plate, nickel plate, &c.

STUDY OF THE FORGEABILITY OF VARIOUS LIGHT AND ULTRA-LIGHT ALLOYS

By A. M. Portevin and P. G. Bastien

The authors have endeavored to determine, by means of laboratory tests, the optimum conditions for hot-working light and ultra-light alloys. With this in view they have compared the results obtained from static bending and compression tests and dynamic bending and tensile tests. They have indicated the important part played by the rate of deformation, and have shown that the bending test appears to be the most convenient, speedy, and sensitive. The tests have been carried out on aluminium; on copper-aluminium alloys containing 6 and 12 per cent of copper; on aluminium-magnesium alloys containing 5, 10, and 15 per cent of magnesium; on magnesium; on magnesium-copper alloys containing 5, 10, and 15 per cent of copper; and on magnesium-aluminium alloys containing 3, 6, and 9 per cent of aluminium. The methods of testing employed have made it possible to define the capacity for hot-work of these various alloys.

VEINING AND SUB-BOUNDARY STRUCTURES IN METALS

By L. Northcott

A network structure, termed veining, which occurs within the crystals has been studied in several pure metals and in many alloys of copper, and methods for its production are discussed. The structure is shown to be due to the precipitation from solid solution, in a network form, of the oxide of the metal during cooling. The influence of alloying additions on veining in copper has been examined and the effect of heat-treatment and recrystallization on veining correlated with changes in hardness. Similar structures referred to as sub-boundary structures have been observed in a number of other alloys. These structures are due to the precipitation, also during cooling, of a constituent of the alloy.

THE COMPLEX INTERDEPENDENCE OF THE PROPERTIES OF ALLOYS AND THE INDUSTRIAL CONDITIONS OF THEIR MANUFACTURE, TESTING, AND USE.

By Marquis R. de Fleury and H. Portier, Dr.-Ing.

A study of indirect factors affecting the quality of foundry castings, examination of their reciprocal action and of the importance of their recognition in obtaining sound castings.

Utilization of scrap in the foundry, lowering of the quality of alloys by successive remelting; the use of organized production; control of raw materials; influence of the process of solidification of alloys and of the factors of moulding and casting; influence of design of castings and their size. Considerations regarding thermal treatment, modulus of elasticity of alloys, thermo-dynamic conditions, and the length of service.

THE CREEP OF TIN AND TIN ALLOYS. PART I.

By D. Hansen and E. J. Sandford

The paper describes results of creep tests of long duration on tin and some of its alloys in the rolled condition. Silver up to 3.5 per cent greatly improves the creep-resistance of tin. Bismuth-tin alloys are more resistant to flow than pure tin at stresses above the 300 lb./in.^{2}, but at lower stresses they are inferior to pure tin. Antimony improves the creep properties of tin: the alloy containing 8.5 per cent antimony withstands a stress three times that of pure tin for an equal duration. Cadmium-tin alloys are greatly improved by heat-treatment and offer considerable resistance to creep. The mechanism of failure of these alloys is discussed. Results are given of tests on lead-tin solders and on the cadmium-tin eutectic alloys: these flow under stresses as low as 130-150 lb./in.^{2}. It is shown that in many cases there is no relationship between resistance to creep and ultimate tensile strength.

Correction—Cyanide Poisoning

In our September issue on page 346, we published a description of a new method of treatment for cyanide poisoning. In this article a serious typographical error occurred. The chemicals "sodium nitrate" and "amyl nitrate" were mentioned as the ingredients of the antidotes described for cyanide poisoning. They should have been sodium **nitrite** and amyl **nitrite.** We are informed also that the new antidote consisting of sodium thiosulphate and amyl nitrate pearls, is very easy to administer and very much more effective than the old method, which consisted of intravenous injections.

Specifications for Finishes

Q.—Will you be kind enough to advise us as to where we may be able to obtain information as to how to produce the finishes on brass hardware in accordance with the specifications U. S. 1 to 30, inclusive?

A.—The specifications for these finishes are given in full in Specification FF-H-106, June 6, 1933, entitled Federal Specification for Hardware, Builders; Locks and Lock-Trim. These specifications are obtainable from the Federal Specifications Board, Washington, D. C.—Ed.

Plating by the Amperehour Meter Method

By ROBERT W. WILSON
Consulting Chemist,
Springfield, Ill.

It Provides Accurate Knowledge of Thickness. It Assures Economy by Avoiding Overplating.

THE use of electrical instruments in manufacturing processes has contributed a great deal toward better products, consistent uniformity and greater economies. In the plating industry too, there is an opportunity to adopt instruments which will aid considerably in improving plating standards —in eliminating much guesswork—in avoiding waste. With the present advent of specifications for electroplated coatings, the necessity of determining exact values becomes of even more vital importance. To employ the help of electrical instruments in solving this problem seems the logical step.

The amperehour meter has always offered a simple but very effective means toward this end. While it has been applied to a considerable degree for these purposes, its application in the industry is greatly increasing in popularity. The advantages of this meter will not be underestimated if the results of its application are carefully considered.

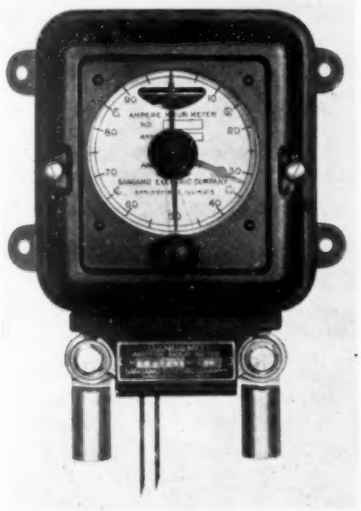


Photo A: Amperehour Electroplating Meter manufactured by the Sangamo Electric Company

Photo B: Amperehour meters furnish thickness control of the nickel deposit for these two still tanks

To state it briefly, amperehour meters indicate accurately the amount of metal which has been deposited, by providing exact knowledge of the quantity of electricity passing through a given plating bath. By simple computation of the amperehours in relation to the plated area, exact knowledge of the plating thickness is obtained.

The method of computing amperehours by average ammeter readings over a given time, leaves considerable room for error on account of the difficulty of determining the **exact** average current rate.

The amperehour meter provides automatic calculation of the product of current and time. It enables exact duplication of uniformity of batches in a simple manner. Knowledge of the electrochemical equivalent of the metal and approximate cathode efficiency makes possible the calculation of the number of amperehours necessary for a given thickness per square foot. Knowing the number of total square feet of a batch—it is only necessary to set the pointer of the amperehour meter to the proper amount. No further attention of the plater is required—no timing is necessary. Later, should another batch of the same parts be received, the plater simply looks up his records of the previous run and sets the amperehour meter accordingly.

The possibility of some errors with this method are

Photo C: Automatic thickness control is made possible in this chromium tank with Sangamo Electroplating Meter

due to: the changing of the solution—loss of current due to the excess current being used in generating gas at the anode and cathode—loss due to building up of metal on the tank and contacts. However, these losses can be readily computed into the amperehour rate, since there is no method of completely eliminating these errors.

Standard amperehour meters, as furnished for electroplating control, have a dial reading direct in amperehours. The meter is equipped with a contact

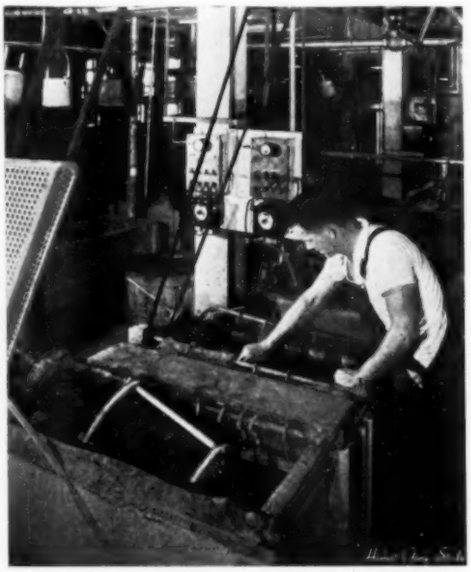


Photo D: The amperehour meters which control the deposit of these mechanical nickel tanks have been in operation for over seven years

target which is operated by means of a knob in the center of the glass window over the dial. A hand located directly over the dial is driven by the meter. The target can be set at the required number of amperehours for any plating operation. The hand moves from zero in a clockwise direction around the dial until it reaches the target—when contact is made against a pin. Through this pin, an electric light or bell can be operated as the signal.

If preferred, the auxiliary circuit connected to the

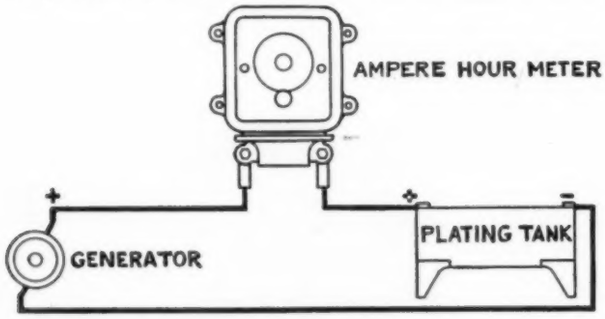


Fig. 1. Connection Diagram. Amperehour meter for electroplating work

contacts in the meter may close the trip coil of a circuit breaker, so arranged as to cut off the current and stop the plating operation. For some work the circuit breaker is objectionable, as it has been found that the work will stain if left in the bath for more than a few moments with the current shut off. In such cases it is desirable to have only a signal so that the attention of the plater is called by a bell or light, after which he can remove the work from the bath. For some classes of work the circuit breaker scheme is entirely satisfactory and has been used to good advantage.

Operation of the amperehour meter is simple. Because the electrochemical equivalent of metals is readily available, it takes but little practice to trans-

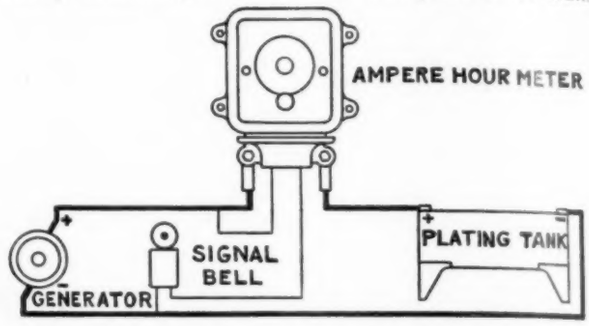


Fig. 2. Connection Diagram. Amperehour meter for electroplating work with signal bell

pose these equivalents into amperehours. A few experiments usually show the operator the actual electrochemical equivalent applying to the operation in question, which may be thereafter used as a multiplier. For instance: consider a dial reading zero to one hundred amperehours, used in nickel plating. A test run should be made in which the weight of the deposit is actually measured. Assuming that the meter reads sixty amperehours and that the weight of nickel de-

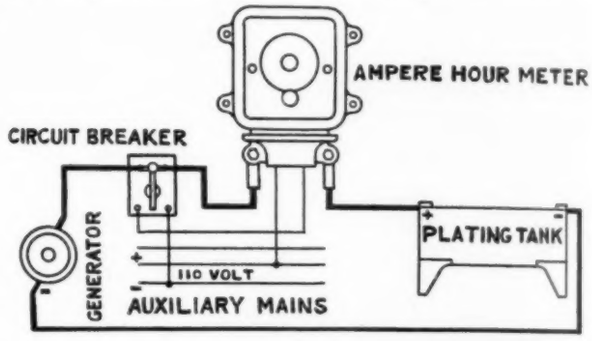


Fig. 3. Connection Diagram. Amperehour meter for electroplating work with circuit breaker

posit is 63.04 grams at 96 per cent solution efficiency. This shows that 1 amperehour is required to deposit 1.05 grams of nickel in this particular process. To deposit 31.5 grams of nickel, for example, the pointer should be set at 30 amperehours.

Amperehour meters are available in current ratings from 10 to 100 amperes, self-contained, and in larger capacities are furnished with separate shunts.

Bearing Bronze

Q.—We would like to have your recommendations for an alloy bearing bronze suitable for automobile truck and tractor gas engine bushings.

You will undoubtedly have some knowledge of a suitable metal for this class of work, and we would appreciate your advising us at your earliest convenience regarding the above alloy.

A.—A suitable alloy for this purpose, superior to 80-10-10 in the qualities mentioned, has the following composition:

Copper	86 per cent
Tin	6 per cent
Lead	5 per cent
Zinc	3 per cent

No special precautions are necessary in the melting and casting of this metal.—**H. M. St. John.**

General Motors Win Chromium Plating Patent Suit

Circuit Court of Appeals Reverses Decision of District Court; Rules Against United Chromium.

UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT.
Decided September 21, 1936.
UNITED CHROMIUM, INCORPORATED
Plaintiff-Appellee,
—against—
GENERAL MOTORS CORPORATION, THE NEW DEPARTURE MANUFACTURING COMPANY, and THE BASSICK COMPANY,
Defendants-Appellants.

Before:
MANTON, SWAN and MACK,
Circuit Judges.

Appeal from the United States District Court for the District of Connecticut. Suit for infringement of patent No. 1,581,188. Decree for plaintiff; defendants appeal. Reversed.

DRURY W. COOPER
MERRELL E. CLARK
FRANK E. LIVERANCE, Jr.
ALLAN C. BAKEWELL,
Counsel for Appellants.

LIVINGSTON GIFFORD
GEORGE F. SCULL
GUSTAVE R. THOMPSON
NEWTON A. BURGESS,
Counsel for Appellee.

MANTON, Circuit Judge—

This suit is for infringement of patent No. 1,581,188, application filed December 19, 1925, and granted April 20, 1926, to Fink for a process of electrodepositing chromium and of preparing baths therefor. We considered this patent heretofore and held it valid and infringed as to Claims 1-6, 10-13, 15, 16 and 18. United Chromium Inc. v. Internatl. Silver Co., 60 Fed. 2, 913. The Claims here in suit are Nos. 4, 6, 10, 13, 16 and 18.*

In our former opinion we held that the novelty of the Fink invention lay in the composition of the bath for electrodepositing chromium and the realization that it was not necessary to add chromic sulphate $Cr_2(SO_4)_3$ as a catalyzer to the bath but that the sulphate radical (SO_4) in any other form would do as well and that the important factor was the total amount of sulphate radical present, irrespective ot the form it might be added. The court said:

> "What Fink really did was to single out the acid radical as a catalyst disregarding the substance which happened to contain it. * * * Nobody had thought of this before, and for that reason nobody had found a dependable process."

And further

> "It was only after repeated experiments that it occurred to Fink that the radical alone was the catalyst, whether in chromic sulphate, in sulphuric acid, or not a sulphate radical at all. The optimum ratio then followed from trial and error."

The record here differs from that in the International Silver case, supra, in that the evidence clearly establishes prior invention of the essential principles by Marvin J. Udy. Udy was employed by a subsidiary of the Union Carbide & Carbon Co. and filed an earlier application for a patent on a process for electrodepositing chromium discovered by him. After Fink's patent issued, an interference was declared between his claims and those of Udy. However, the General Chromium Company, which owned the Udy application, and the company owning Fink's patent combined and formed the appellee. Udy, under protest, filed a concession of priority to Fink and subsequently waived the right to the issuance of a patent to himself. (Fink claims May, 1924 as the date of his invention.) Udy was a chemist of wide experience and commenced work on chromium plating in 1922 at the plant of the subsidiary corporation of the Union Carbide & Carbon Co. His employer was developing processes both for chromium "winnings" and for plating of articles it manufactured.

The record on this appeal contains contemporaneous written records of Udy's work which constitute a complete and scientific disclosure. These reports, beginning with July 18, 1922 and the first detailed chemical analysis of the solution used in tests were reported October 16th, 1922. Until the Fall of 1923, Udy used a bath consisting of chromic acid (CrO_3) and chromium sulphate $Cr_2(SO_4)_3$. In order to insure the purity of his chromic acid, Udy made it a practice to treat it with a barium compound to precipitate and remove the sulphate which it contained as an impurity. The appellee's expert acknowledges that

*4. In a method of electrodepositing chromium from solutions of chromic acid, reducing the chromic acid at the cathode by a catalyst, said catalyst being a radical which normally is an anion.

6. In a method of electrodepositing chromium from solutions of chromic acid, reducing the chromic acid at the cathode by a catalyst, said catalyst being a sulphate radical not exceeding the proportion of 5 grams per litre of solution having a concentration of 250 grams chromic acid, or an equivalent amount of an equivalent radical or radicals, the total of said radicals being stable radicals.

10. In a method of electrodepositing chromium from solutions of chromic acid, reducing the chromic acid at the cathode by a catalyst, the total of said catalyst being stable radicals not exceeding an amount equivalent to the proportion of 5 grams of sulphate radicals per litre of solution containing 250 grams of chromic acid.

13. A method of electrodepositing chromium from solutions of chromic acid, comprising reducing chromic acid at the cathode in the presence of a catalyst and of a protecting hydrogen film, the total of said catalyst being stable radicals not exceeding an amount equivalent to the proportion of 5 grams of sulphate radicals per litre of solution containing 250 grams of chromic acid.

16. A method of preparing solutions for electrodeposition of chrominum, comprising dissolving commercial grades of chromic acid ascertaining the amount of catalytic radicals therein, and adding to or removing from said solution sufficient catalytic radicals to make a total amount of catalytic radicals present in the solution equivalent to the proportion of 5 grams or less of sulphate radicals per litre of solution containing 250 grams of chromic acid.

18. A process for the continuous electrodeposition of chrominum, comprising regulating the content of stable radicals (catalytic agent) in the bath to an amount not exceeding the proportion of 5 grams of sulphate radicals per litre of solution containing 250 grams of chromic acid.

the use of barium is a satisfactory way to insure the absence of sulphate in chromic acid. In the course of an investigation by Udy of anode coatings, he produced a bath containing chromic acid free of sulphur. No chromium metal was deposited so he began to sulphate the anode and seeing the results, he records that it led him to a decision "to begin a series of runs in which he added a solution containing barium and remove the SO_4 from solution in small steps until the solution was entirely free of SO_4. This would show whether SO_4 is necessary. This work is now in progress."

He was determining what part, if any, the acid radical, specifically the sulphate radical SO_4 plays in chromium plating and in the conclusion of his report, Udy makes the statement which shows that he was then on the trail of the matter which Fink claims to have invented. After stating the belief that it was unnecessary to have the sulphate radical SO_4 present in the form of chromic sulphate $Cr_2(SO_4)_3$ but that it was more likely that a small amount of the free sulphate radical SO_4 was necessary, he records:

> "The question of SO_4 and reduced chromium in solution is not yet clear but future work may tell if one or the other or both are necessary for the deposition of chromium."

By December 7, 1923, Udy had a complete understanding of the invention. This recorded the discovery that a small amount of the acid radical, SO_4 was necessary, and the $Cr_2(SO_4)_3$, previously used, was not important. His report on February 4, 1924 contained a full detailed description covering periodical analysis of the baths, charts of operations and results, discussions of results and reasons therefor, limits of concentration in the bath and the chemical features thereof, and the conclusion that

> "The governing factors in electrolysis of such solutions are the SO_4 content, the concentration of chromium in solution and the temperature. The limits to the above factors have already been made and discussed."

This was a complete statement as to the governing factor, recorded by Udy at least three months before any date asserted by Fink, and nearly two years before the latter's application. In March, 1924, Udy prepared a report of his achievements to date. This was done in the usual course of business and copies submitted to his superiors. Among other things he said:

> "It is thus seen that the addition of $Cr_2(SO_4)_3$ is simply a method of adding SO_4 to the solution and in itself is of no importance."

This report of Udy contained the complete scientific disclosure of the matters of the claims patented. In these records, prior to Fink's date of conception, Udy told how to make and maintain a bath of pure chromic acid by controlling the acid radical.

Udy's was no abandoned experiment. He continued to use the limits on the amount of SO_4 in the solution, as determined by him then, until 1931. Moreover, he used his invention in practice. Up to October 1927, Udy plated articles sent to him; the specific things are shown in great number in the record. Besides, he succeeded in "winning by his method of electrodeposition, 1,400 lbs. of pure chromium, enough to have plated thousands of automobile radiators. This "reduction to practice" use provides a safe margin over that required for "reduction to practice." Cf. Egbert v. Lippman, 104 U. S. 333.

In June, 1924, a patent application signed by Udy was filed by his employer. This was 18 months before Fink's filing. No interference with Udy's application was declared by the Patent Office when Fink filed his application. Later on, however, at Udy's request, interference was declared. In his application, Udy's discovery is disclosed. It reads:

> "In accordance with my invention, chromium is deposited from an aqueous solution of chromic acid containing a closely controlled quantity of sulphuric acid."

The appellee having acquired and controlling Udy's application, obtained his waiver and concession of priority to Fink, as related above. But the fact that Udy had proceeded to apply for a patent, which was only withdrawn a long time after Fink applied for his patent, is proof that Udy had not abandoned but was asserting his invention. Cf. Smith. v. Hall, 83 Fed. 2, 217 (C.C.A. 2)

On this record, differing as it does from the record before the court when the patent was previously considered by us, we are satisfied that there was prior invention established by the evidence of Udy's knowledge, practice and prior patent application This prior invention makes Fink's patent invalid; he was not the "first inventor" nor was his process "not known or used or used by others in this country before his invention" with the statute. Rev. Stat. §4886, Mar. 3, 1897, c. 391 §1, 2, 29 Stat. 892, 35 U.S.C.A. §31, as amended, May 23, 1930, c. 312, §1, 46 Stat. 376. See also Rev. Stat. 4890, 35 U.S.C.A. §69.

In view of Udy's prior invention, his patent application should have been granted rather than Fink's, since Fink was not the first inventor, and Fink's patent must be held invalid. Milburn v. Davis-Bournonville Co., 270 U.S. 390; Stelos Co. Inc. v. Hosiery Motorment Corp., 72 Fed. 2, 405, 406 (C.C.A. 2).

Decree reversed.

We understand that the matter of further steps to be taken by United Chromium, Inc. has been referred to their attorneys.—Ed.

Bright Dip for Steel

Q.—Would you get your technical staff to suggest a cheap solution to dip bright mild steel bolts (¾" x ¼") in to prevent them rusting. The water soluble oil compound used in the automatic screw machines is the cause of trouble if they are left standing any time at all. At present we are drying in sawdust.

Also can you suggest a better filter cloth for chrome solution than asbestos.

A.—To prevent the steel bolts from rusting, it is necessary that the soluble oil compound be removed by the use of a suitable alkaline cleaning solution, rinsed well in clean, hot water and dried.

After drying parts can be immersed in a solution made up by mixing 10 parts by volume of a good grade of mineral oil with a viscosity of about 220 seconds and 90 parts of either gasoline or carbon tetra chloride. This will leave a thin film of oil on parts and prevent rust without affecting the finish.

The filtering of chromium plating solutions is difficult due to the fact that such a solution is an extremely active oxidizing agent and will destroy any organic filtering medium. A clean solution may be obtained by allowing such a solution to stand overnight, and then syphoning into another container.

All heavy particles including lead chromates will settle out and be removed.—**T. H. Chamberlain.**

Hairlining of Vitreous Enamels

The Primary Cause is Cracks in the Bisque, Caused by Warping During Handling, Firing, etc. The Enamel, However, is Very Important*.

By DR. J. E. ROSENBERG

Director of Research,
O. Hommel Co., Pittsburgh, Pa.

OF ALL problems in connection with the application of vitreous enamels on steel, that of hairlining is one of the most difficult to overcome. It usually occurs on complicated shapes, but may appear even on regularly shaped articles.

Hairlining is the appearance, in the cover coat enamel, of fine black lines which are usually paralled and which seem to have some definite, rather than haphazard, design. The defects can usually be covered with a second application of cover coat enamel. They are, therefore, not very serious in the case of ware which receives two or more cover coats, although even then they may sometimes show through the second coating of enamel. But with the present wide use of one cover coat ware, the problem is exceedingly important.

Cracks in Bisque

The hairlining is due to the development of cracks in the bisque during the firing process. Under normal conditions these cracks, if they do develop, are healed up when the enamel melts. If, however, the cracks are large, only certain types of enamel are able to overcome this cracking. The cracking of the bisque is due in general to a mechanical strain produced in the warping of the steel. Cracking may also take place due to a difference in the coefficient of expansion of the steel and the bisque, but this is not as important a factor as the warping.

The amount and extent of the warping depends on the following factors:

1. The shape and size of the piece.
2. The amount of strain put into the piece during stamping and drawing processes.
3. The manner in which the piece is supported during the firing.
4. The gauge of the steel used.

In general, any piece that is easily bent or flexed is likely to hairline. The heating in the furnace is never uniform. Either the top or the bottom may receive more heat, and the difference in temperature between the two surfaces may give rise to at least a temporary warping. During the drawing, a stress is developed in the piece of steel. The annealing operation will usually relieve that stress, and also remove the drawing compounds and grease on the steel.

Annealing Important

Sometimes, however, these organic materials are removed by means of an alkaline solution and the annealing operation is dispensed with. When this course is followed with a piece that is not too rigid or which has long straight sides, then trouble may be anticipated. One would think that the drawing strains would be removed from the steel during the firing of the ground coat. Often it is, if the firing of the ground coat is sufficiently prolonged, but this is not always the case. Naturally, with a soft ground coat one is more likely to have this trouble than with a hard one, because in that case, the firing is not sufficiently high to relieve the strain and allow the metal to assume the shape of least strain.

Another source of trouble comes from the fact that the mechanical strength of steel varies with its temperature. Thus a piece that is rigid at room temperature, may, when supported improperly, sag during the firing process, giving rise to defects, which would be easily eliminated by the proper support of the piece. Finally, the strength and stiffness of the steel depends on the gauge. The use of thin gauge material, in general, gives rise to more or less hairlining due to the lack of mechanical strength.

Hairlining may also be caused by improper handling of the ware between the drying and firing processes, and a small amount of carelessness may give rise to serious difficulties.

Enamel a Factor

From the discussion so far it might be inferred that all the trouble begins and ends with the steel, but this is not the case. On the same piece of ware handled under exactly the same conditions, one enamel may hairline, while the other will not. This is because the ability of the under-fired bisque to withstand a strain without cracking varies. In general, a thin coating of enamel is less likely to crack than a thick one, just as a thin piece of glass may be bent quite readily while a thicker piece will not withstand such a deformation. This is another reason for the difficulties encountered in one coat ware; it is necessary to apply a relatively thick coating, and this means a coating that is unable to undergo very much flexing without cracking.

Aside from the thickness of the coating, there are several factors which effect the strength of the unfired bisque. The four important factors are:

1. The nature of the frit.
2. The kind and amount of clay added.
3. The fineness of the grinding.
4. The mill additions.

Frit

Needless to say, the nature of the frit is very important, because one frit may have a relatively low

* From The Ceramic Forum, July, 1936; O. Hommel Co., Pittsburgh, Pa.

surface tension and flow-out, thus eliminating the cracks. Another may behave very much as water on a dusty road; that is, it will tend to draw together and form globules. There is also the consideration that one frit when it melts will wet the ground coat and flow over it, while another will not. The factors which influence these properties of a frit are many and complicated, and very little is to be found on this subject in the published literature. There are other properties of the frit which affect its tendency to hairline but a discussion on these is beyond the scope of this article.

Clay

Since the clay is the bonding agent of the bisque, the strength of the bisque depends also on the kind and amount of the clay used. It has been found that, in certain cases, an increase in the amount of clay will reduce the hairlining. Practical enamelers will often make this adjustment, but anyone that has had the experience knows that it is not a cure-all. The mill additions will also affect the strength of the bisque, because they set-up the enamel and affect the structure of the slip.

Fine Grounding and Hairlining

Most enamelers are of the opinion that fine grinding produces hairlining, and the practical enameler will, when he runs into this trouble, blame it on the grinding. Whether the difficulties are actually due to fine particles, or to other effects caused by fine grinding, is to the writer an open question. The fine work of Frank R. Porter on the advantages of finely milled enamels seem to indicate that one should not avoid fine grinding. Considerable work done in our laboratories indicates that fine grinding does not cause hairlining of good enamels. If an enamel has a tendency to hairline, the finer the grinding the more aggravated is the hairlining.

Drying

Aside from the properties of steel and of the unfired bisque, the method of drying is very important. Improperly dried ware will hairline, while the same ware under normal drying will give no trouble. Too quick drying will cause the formation of a crust on the surface of the bisque while the layer next to the steel is still wet. This sealed-in moisture will cause cracking of the bisque when the firing is done. Enamel ware should not be dried at a temperature exceeding 130 and 150°F. and this drying is much more efficiently done with a good circulation of normal air, than with higher temperatures. In an actual instance encountered in practice, of a load of ware air-dried, not one hairlined, while 90% of a similar load dried in an oven, hairlined.

Thus the primary cause of hairlining is cracks in the bisque, caused by strains imposed upon it by handling, warping, etc., during the firing process.

However, it should be realized that the enamel is the pivotal point around which the whole discussion should swing. If the enamel is correct, cracks may occur in the bisque without causing trouble. The enamel will have the power of filling-in. If the enamel does not have this important property, then cracks in the bisque may result in hairlining.

In conclusion, whenever hairlining occurs the enameler should carefully check his procedures as to the above mentioned points and if this does not eliminate the trouble, the only course left is to change his enamel.

Bright Dip for Cast Bronze

Q.—We are interested in determining what acid and in what dilution it should be used, to brighten a cast bronze drum that is used in connection with canning machinery.

Our customer has asked us to get this information and treat the castings as they come from the sand. The main objection is the presence of blackening from the molds, which, due to the intricacy of the casting, is difficult to remove in the cleaning department.

Would you also please advise us if it would be practical to treat these castings after they have been machined, i.e., would any detrimental effect occur to to the machined surfaces?

A.—It will be necessary to clean the casting of all sand before immersing them in the dip, in order to conserve the acid, which can be done by sand blasting, water tumbling, or wire wheel brush. The following dip is good for this purpose as it does not fume like the regular brass dip:

Sulphuric acid	10 pounds
Saltpeter	2 pounds
Water	5 pounds

First, dissolve the saltpeter in water in an earthenware crock, add one pound of the acid pouring in a thin stream, stirring meanwhile with a piece of glass. This will heat the water and it is necessary to stop the addition of acid from time to time in order to allow the solution to cool and prevent it reaching a boiling temperature. For this reason the acid is added gradually, and only a pound at a time.

The solution should be prepared at night and before morning it will be cold, and after the acid has been poured off the potassium sulphate that will be found in the bottom it is ready for use.

The castings are dipped for a few seconds, strung on a wire, then they are rinsed in running water. They will keep their color better if they are dried by dipping in hot water in which a little lime has been dissolved.

It may be that if you sand blast your castings dipping may not be necessary. We do not think the dipping would injure your machined castings. However, we suggest that you try it before adopting it for regular practice.—**W. J. Reardon.**

Editorial Comment

Platinum Pyrotechnics

ONLY about two or three months ago platinum was selling as low as $30 per ounce. Suddenly it jumped in three or four stages to $43, then to $53, then to $62, and then to $70. Why?

Platinum has always been, market-wise, a volatile commodity. Natural resources are limited, for practical purposes, to Russia, Colombia, South Africa and Canada. Accurate platinum statistics are not obtainable. It is said that the production is controlled by about a half dozen organizations at the outside, and that these people know just what is what; but no one else. Consequently, the rest of us must guess. Our guesses are as follows:

1. A strong demand for munitions in which platinum is used.
2. Increased jewelry business.
3. Producers are holding large stocks as a hedge against inflation.
4. The formation of an International Cartel.
5. The formation of a syndicate to buy platinum and issue warehouse receipts against it, the certificates being offered to the public as a speculation and a substitute for gold, as a hedge against inflation. Rumors are that this syndicate has bought up the floating supply, and is one of the primary causes in the skyward jump in price.

The above are guesses, any or all of which may be the cause. Undoubtedly some rise was due to the fact that platinum was too low at $30 and improved consumption in the arts and industries had its natural effect. However, the doubling in price during the past three months, cannot be accounted for on such grounds alone. Undoubtedly speculation has had a great deal of influence. The future of the platinum market is decidedly uncertain.

Alloyed Lead

IMPORTANT progress has been made in the lead and lead products manufacturing industries, as a result of scientific investigations on the properties of this metal, alloyed with small quantities of other, formerly unthought of agents. Lead has always been a most important staple, best known for its use in paints, storage batteries, cable coverings, pipes and bearings. Its best known alloying agents have been antimony and tin. Recently, however, lead has been found to have immensely improved properties when alloyed with such expensive and unusual materials as tellurium (to a small fraction of a per cent), and also with silver (1 per cent).

Lead is one of the most important metals in point of quantity produced. We see the possibility also that it may be much more widely used in diversified industries under the stimulus of research.

Over-Regulating Business

ONE of the problems facing business in the aggregate, and to a fair extent the metal products manufacturing business also, is the new Patman-Robinson Act known as the Anti-Price Discrimination Law.

In some ways the purposes of this Act call for sympathy in that it aims to eliminate unfair price discrimination—purposeful selling below cost. The Act prohibits price discrimination not only where it tends to create a monopoly, but also where it may injure, destroy or prevent competition among all parties —both purchasers and sellers. Where the Clayton (Anti-Trust Act) allowed a differential in price based on differences in the grade, quality or quantity, the Patman-Robinson Act allows price variations based on quantity only to the extent that they reflect differences in the cost of manufacture, sale or delivery.

These and other points lead the reader to infer that the new Act creates a presumption that any price differential is unlawful and that it places upon the person accused the duty of proving the contrary. Price discrimination is unlawful not only for the person granting the price but also for any person knowingly receiving its benefits.

With all the desire in the world to eliminate unfair business practices, we nevertheless see here an attempt at perfection, an undertaking to regulate and control business in such detail, as to make it practically unworkable. It is the general fear now that everybody will unwittingly become a law-breaker at one time or another. Legitimate, current business practices are looked upon with suspicion. Every transaction must be fortified with a voluminous record, and hesitation, disturbance and dislocation may be the result.

As usual, under the trial and error method, we can only hope that the many unworkable features of this Act, which will be found in practice, will be eliminated and the bill revised or repealed in short order.

5,536 Shop Problems

OUR readers need no introduction to our Shop Problem Department, in which we answer technical questions submitted to us. We have no doubt that our readers know also that the problems published form only a small proportion of those which we receive and answer. We have always felt this to be one of our greatest services to readers.

We looked forward for some time to an opportunity to celebrate when we reached No. 5000 in the number of problems published, but unfortunately, we were so busy that No. 5000 went by us without even being noticed!

We must admit that we have not the patience for No. 10,000 since it may take another 30 years. So—since we are not superhuman—we shall say our piece now, and celebrate No. 5,536, for no reason except that we don't want to wait any longer!

We have published 5,536 answers to technical questions submitted by our readers. The total number actually received and answers mailed would probably be three times that figure. How much good this service has done, nobody can calculate or even guess. We know, however, from reports, verbal and written, direct and indirect, that we have helped and that we have been appreciated.

"We point with pride!"

New Books

Engineering Alloys by Norman E. Woldman and Albert J. Dornblatt. Published by the American Society for Metals. Size 6 x 9; 622 pages. Price $10.00.

Here is a book written to meet the growing demand for a practical and technical reference work on engineering alloys. The data is the result of a compilation of material on practically all proprietary, commercial and technical alloys manufactured in the United States and many alloys of England, France, Germany and Sweden. It gives information on chemical compositions, physical and mechanical properties, uses and the names and manufacturers of proprietary alloys.

Section 1, gives an alphabetical listing of all alloys with a corresponding index or serial number; Section 2, the trade name, composition, properties, uses, general remarks and a key number designating the manufacturer; Section 3, an index of alloys, classified according to typical uses or special characteristics; Section 4, an alphabetical listing of the manufacturers with a summary of the alloys that are produced by each; Section 5, a list of manufacturers with addresses in serial order; Section 6, reference in serial order according to their key number; Section 7, an appendix with useful tables and miscellaneous information.

No better review or description of this book can be given than the following taken from the introduction, written by Dr. William Campbell of Columbia University.

"There have been lots of books on alloys—good, bad and indifferent—but not one of them covers the ground the way this book does. I once wrote a 'List of Alloys'—to my sorrow. Ever since I have been getting letters, even telephone calls, saying someone I knew had recommended to the writer or speaker that he get in touch with me. He wanted to know where he could buy Sisco Bronze or New Bedford Brass, and what were the properties and so forth. Well, I always like to oblige and as the alloy in question was not usually one of the better-known commercial alloys, I would look it up in this Abstracts and that Index and elsewhere and never find it. Now all that trouble will be taken off my shoulders. I'll say 'Look it up in Woldman and Dornblatt's Engineering Alloys'."

Steel Physical Properties Atlas. By C. N. Dawe. Published by American Society for Metals. Size 8½ x 11; 87 pages. Price $2.50.

The author has used a unique new method to present a complete physical property data. The book includes 35 graphs, many of them in colors, in combination with tables and written factual information to give concisely the properties of S.A.E. steels, cast steels, plates, rounds and stainless steels, high tensile strength steels, etc. The book is attractively bound and the material desired is easily found.

S.A.E. Handbook. 1936 Edition. Published by the Society of Automotive Engineers. Size 5½ x 8½ price to members $2.50; to non-members $5.00.

This handbook needs no introduction as it is now a standard Annual. It embraces all of the current standards and recommended practices adopted by the Society, including new and revised specifications issued during the past year.

Sections covered by the book are: Units, Parts and Fittings; Processed Materials; Fabricated Materials; Screws, Bolts and Washers; Tests, Ratings and Codes; Transportation and Maintenance; Tools and Production Equipment; Nomenclature and Definitions; Miscellaneous and American standards.

A considerable section is devoted to non-ferrous metal specifications, including solders, white bearing metals, aluminum alloys, brass, bronze and copper alloys, wire and rods, zinc alloys, miscellaneous alloys, protective coatings (plating), die materials and rare metals.

Chemist's Year Book for 1936. Edited by E. Hope. Published by Sherratt & Hughes, Manchester, England. American agents, Chemical Publishing Co. of N. Y. Size 4 x 6, 1,257 pages. Price $6.00.

This is a British publication but the data in which it deals is international. It covers the fundamentals of chemical properties of materials including atomic weights, physico-chemical constants, solubilities, refractive indices, crystallography, qualitative analysis, spectrum analysis, etc., into industrial chemicals and chemical processes.

It is a useful addition to a good reference library.

Government Publications

Byproduct Sulphuric Acid at Copper and Zinc Plants in 1935. Final Summary. U. S. Bureau of Mines, Washington, D. C.

Guide to Government Purchasing. U. S. Department of Commerce, Washington, D. C.

Guide Books for American business firms and individuals desiring to participate in the large market for products purchased by the various branches of the Federal Government have been made available by the Machinery Division, and Forest Products Division, Bureau of Foreign and Domestic Commerce, Department of Commerce. The information contained in these publications can be utilized by producers and sales representatives of every kind of merchandise consumed by the Government. Copies of either report may be had at five cents each from the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington.

Minerals Yearbook, 1936. United States Bureau of Mines, Department of the Interior, Washington, D. C.

The volume contains 69 chapters, 154 illustrations, and 1,136 pages, and provides in convenient form a comprehensive and accurate record of economic developments and trends in the mineral industries of the United States during the year 1935. In addition to a presentation of the fundamental statistics of the production and marketing of a hundred commercial minerals, world production of minerals and the economic aspects of international mineral policies are reviewed. The mineral production of the United States in 1935 was valued at $3,688,000,000, an increase of nearly 11 per cent from $3,325,100,000 in 1934.

Secondary Metal Recovered

According to reports from the U. S. Bureau of Mines, copper produced in 1935 by smelters of secondary material includes 121,528 tons of pig copper, part of which was electrolytically refined, 84,600 tons of copper in remelted brass, and 94,300 tons of copper in alloys other than brass; an increase over 1934 of 23,083 tons in pig copper, a decrease of 300 tons of copper in brass, and an increase of 22,200 tons in copper alloys other than brass. The value of secondary copper recovered in 1935 was $74,517,400, an increase of $14,133,400 over 1934.

Secondary zinc recovered as pig metal and alloys including brass amounted to 21% of the total output of primary slab zinc in the U. S. in 1935. Total secondary zinc recovered was 55,400 tons in 1935 against 29,300 tons in 1934.

Secondary tin recovered in 1935 in the U. S. amounted to 27,900 tons valued at $27,498,200 compared with 24,900 tons valued at $25,487,600 in 1934.

Secondary aluminum recovered in the U. S. in 1935 totalled 51,400 short tons valued at $19,018,000 compared with 46,400 tons valued at $17,632,000 in 1934.

Technical Publications

Medico-Legal Aspects of Silicosis. By Dr. M. Kummel. A booklet published by the Medical X-ray Division, Eastman Kodak Co., Rochester, N. Y.

A discussion of the medical, legal, humane, economic and legislative questions involved.

Statistical Year Book of the National Battery Manufacturers' Association. Twenty-eight pages of statistics on storage batteries and component materials with an analysis of the market for automotive batteries. National Battery Manufacturers Association, Inc., 7 E. 44th St., New York.

Copper as a Mould Material. Applications in the casting of metals. By H. J. Miller. Copper Development Association, Thames House, Millbank, London, S. W. 1, England.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

Dark Nickel Plate

Q.—Kindly advise through analysis the ounces per gallon of metallic nickel and chlorides as nickel chloride in ounces per gallon and boric acid.

First purpose is to check our factors for titration, second to get back our former luster which we have lost. The enclosed envelopes are marked according to contents showing pens before preliminary to plating preparation work. The envelopes marked "good" are as removed from plating and are desirable. The envelopes marked "bad" are as removed from plating but are not satisfactory.

We use a nickel brightener, ½ oz. per turn; acid is kept at pH 6.0. Solution is continuously filtered and has no brass or copper pieces in it but seems to plate dark. We add sodium perborate in small quantities from time to time and add a handful of boric acid daily. Most nickel additions are in the form of NiCl all others in the form of single nickel. When desperate we use sodium sulphate and epsom salts, but seldom.

Just now we are running 25 hours, check acid four times a day, keep solution at 94° F. and plate 5V, 80 amps.

A.—Analysis of nickel solution:

Nickel	4.22 ozs./gal.
Chloride, as nickel chloride $6H_2O$	6.85 ozs./gal.
pH	6.3

This solution is not in bad condition for a barrel nickel as far as the metal and chloride is concerned. The pH is slightly high and somewhat better results should be obtained at a lower pH especially with the brightener in use.

To bring pH down add 2 fluid ounces of sulphuric acid per 100 gallons of solution.

The use of epsom salts may cause trouble in connection with a brightener. It is practically impossible to make recommendations for the operation of a solution with brightener inasmuch as the operating conditions are not easily visualized. The use of sodium perborate, for instance, is not understood in your case, inasmuch as this material is normally added to prevent pitting and we would take it that pitting is not being experienced in your barrel.

The brightening agent will be affected by these additional salts. We would recommend that the solution be used as recommended by the manufacturers of the nickel brightener.

—G. B. H., Jr., Problem 5,530.

Gold on Safety Pins

Q.—We contemplate installing an electroplating bath for gold plating safety pins of enclosed size. We would appreciate it if you could give us your advise as to the composition and working condition of a real gold electroplating bath suitable for this purpose and also approximately the cost involved.

The quantity to be plated is rather large and can be up to 65 pounds if necessary to work this bath economically.

A.—The use of an electro gold plating bath for safety pins same as samples submitted would result in an extremely high unit cost. The common practice is the use of an immersion gold dip which deposits a thin film of gold which is satisfactory for all ordinary purposes.

The following solution is used:

Sodium cyanide	4 ounces
Sodium carbonate (soda ash)	4 ounces
Gold as sodium gold cyanide	5 dwt.-20 dwt.
Water	5 gallons
Temperature	115-120 deg. F.

The solution can be used in a chemical stone crock or an enameled jar. Hot water can be used for heating medium.

The gold content can be varied between 5 dwt. and 20 dwt. depending on thickness of deposit and color desired.

The time in bath usually is from 4 to 5 seconds. The average load is about 5 lbs. of pins which are immersed in solution in brass basket and agitated by hand so that a uniform deposit is obtained.

If the base metal of the pins is steel they should be given a brass plate and then burnished to a high finish. Brass base pins should be given a burnishing roll to bring up lustre before plating.

—T. H. C., Problem 5,531.

Gun Metal Solution

Q.—Will you be good enough to send us a formula for a gun metal solution. We make buttons, buckles and jewelry ornaments.

A.—The use of a black nickel solution will produce an excellent gun metal finish. The following solution may be used:

Single nickel salts	10 ounces
Double nickel salts	6 ounces
Zinc sulphate	5 ounces
Sodium thiocyanate	2 ounces
Water	1 gallon
pH	6.6

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name ..... Class of work being plated: .....

Address ..... Volume used: .....

Employed by: ..... Solution depth: .....

Kind of solution: ..... Cathode surface, sq. ft.: .....

Tank length: ..... width: ..... Kind of anodes: .....

Anode surface, sq. ft.: ..... Distance from cathode ..... Original formula of solution: .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary.

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Temp. 65-85 deg. F. Current density 1-1½ amps. per sq. ft. Voltage, ¾-1 volt. Anodes, gas carbon for ¼ of anode area. Nickel for remaining area.

Gas carbon anodes may be used entirely with good results. Black nickel may be deposited directly on brass, copper or zinc. A more uniform finish may be obtained by first flashing in nickel solution. Steel parts should be given a protective coating of nickel before applying black nickel deposit.

—T. H. C., Problem 5,532.

Nickel and Silver Solution

Q.—I have sent two plating solutions to you for testing. The silver solution has poor throwing power, requires too much time to deposit a plate and plates rough deposits. I plate a good deal of pewter and white metal direct in this solution and when the free cyanide is high it causes blistering on such metal. The anode surface used is considerable less than the cathode with a potential of about 4 volts. Solution is about thirty-five gallons.

The trouble with the nickel solution is pitting of the plate. I do not know the original formula of this solution, but it is principally of nickel and ammonium sulphate. The anodes are 97 to 98 per cent cast. The solution is about two hundred gallons.

A.—Analysis of silver solution:

Silver	1.50 ozs./gal.
Free sodium cyanide	3.18 ozs./gal.

The silver is low. Better operation will be obtained from a silver solution when the metal is closer to about 2.5 ozs./gal. This can be remedied by the addition of 1¼ ozs./gal. of silver cyanide. For a matte white deposit the free cyanide is all right. For a bright solution, the free cyanide should be increased by adding two ozs./gal. of sodium cyanide. Smoother and softer deposits will result if potassium cyanide is used in which case one-third more by weight is needed.

The trouble with blistering may be due to the strike solution. If the strike is too high in silver blistering will occur. You do not mention use of a strike solution. The roughness may come from the contamination of the solution by copper and other metals dissolved from the work being plated. From this viewpoint it would be better to make up a new solution and recover the silver from your present solution.

Analysis of the nickel solution:

Nickel	2.13 ozs./gal.
Chloride, as ammon. chloride	.1 ozs./gal.
pH	6.8

Nickel and chloride are low. pH is too high. Correct by adding 5 ozs./gal. of single salts, 3 ozs./gal. of ammonium chloride and 1½ ozs./gal. of boric acid. The pH should then be corrected by adding sulphuric acid. If a sample of solution is furnished after the above additions are made the pH will be checked and the approximate amount of sulphuric acid to add will be reported.

If pitting is very serious suggest you filter the solution if possible. The use of one pint of hydrogen peroxide per 100 gallons of solution will aid in relieving pitting.

—G. B. H., Jr., Problem 5,533.

Silver Solution

Q.—We are mailing you today, under separate cover, a sample of our silver solution which seems to give us some trouble lately. We have 25 gallons of this solution, which is used exclusively for silverware such as coffee pots, creamers and trays. It is five years ago since we analyzed same. We would like to have a check-up on the cyanide and metal content. We usually carry 3 oz. of metal per gallon. Kindly advise us what to add.

A.—The composition of solution is:

Silver	5.61 ozs./gal.
Free sodium cyanide	4.48 ozs./gal.

The metal content is much higher than necessary.

In view of the fact that the solution is also contaminated with other metals, as was shown in test, the best thing to do is to dilute the solution. This will cut down the silver content and also reduce the concentration of the impurities. Whether the dilution will reduce the impurities sufficiently cannot be stated.

Suggest you remove one-half of the solution and replace with water. Then add ¾ ozs./gal. of sodium cyanide (or if possible add potassium cyanide in which case use 1.0 ozs./gal.)

If bright deposits are desired, the cyanide can be increased to a greater amount than given above. The free cyanide may be increased to about 5 ozs./gal. To obtain this figure, after diluting the solution ½, add 2¾ ozs./gal. of sodium cyanide (or 3.5 ozs./gal. of potassium cyanide). The usual brightener is carbon disulphide.

—G. B. H., Jr., Problem 5,534.

Slow Copper Solution

Q.—I am sending you a cyanide copper solution for analysis. Work burns on points and edges. Also plates slow.

A.—The solution submitted has the following composition:

Copper	6.13 ozs./gal.
Free sodium cyanide	1.31 ozs./gal.

A copper solution for usual run of work would not contain so much metal.

In addition to this condition your solution has quite a percentage of impurity which appears to be iron. This will come from the use of an impure grade of copper cyanide. Not having a sample of your work we do not know just how serious this condition is at the present time. However, there is the possibility that after diluting the solution to reduce the copper content that the impurity will also be brought down sufficient to have little or no effect.

Bring the copper down to 2 ozs. per gallon by removing two-thirds of the solution. Make up with water. Then add—three quarters of an ounce per gallon of sodium cyanide.

The alternative to this procedure would be to make up an entirely new solution composed of:

Copper cyanide	3.0 ozs.
Sodium cyanide	4.5 ozs.
Sodium carbonate	2.0 ozs.
Water	1.0 gal.

Best results will be obtained if solution is operated warm (100 deg. F.) and if rolled, annealed copper anodes are used. Also, it is not advisable to use impure copper cyanide as this will add iron to the solution that will cause dark deposits. Make certain that the tank is not in the circuit.

—G. B. H., Jr., Problem 5,535.

Copper and Brass on Bag Frames

Q.—Enclosed is a part of a metal frame upon which is a finish we wish to duplicate. The under coating, we believe to be a heavy copper plate and the top coating we believe to be a brass plate. Is this correct?

If so, will you please inform us what percentage of copper and zinc the brass anodes must be, the formula for a still tank brass plating solution, temperature, c. d. and voltage, and how this matt finish is obtained.

A.—The sample submitted has been given a heavy deposit of copper and then a thin deposit of bright brass for color, with a coating of lacquer for protection. The matt finish has been obtained by an acid dip after copper plating before depositing brass. After the mat dip it may be necessary to bright dip to even up the finish. The mat dip may be made up as follows:

Sulphuric acid	1 gallon
Nitric acid	1 gallon
Zinc oxide	2 lbs.

Operate at a temperature of 160-180 deg. F. in a chemical stoneware crock. Heat by means of water bath. Keep free of water and chlorides. If mat is coarse add sulphuric acid; if too fine nitric acid.

A brass solution of the following composition may be used:

Copper cyanide	3.6 ozs./gal.
Zinc cyanide	1.2 ozs./gal.
Sodium cyanide	7.5 ozs./gal.
Sodium carbonate	4.0 ozs./gal.
Water	1 gallon

Temp., 75-100 deg. F. current density, 3-5 amps./sq. ft.

Voltage, 2-3 volts. Anodes, 80% copper, 20% zinc.

Free cyanide, 2.5 ozs./gal.

One pint of ammonia added to each 100 gallons will aid in producing a good color when starting a new solution.

Arsenic is used as a brightener. Dissolve 2 lbs. of caustic soda in ½ gallon of water and then add 1 lb. of white arsenic. Use one ounce of this solution to each 100 gallons of plating solution. An excess must be avoided as it will cause the anodes to turn black.

—T. H. C., Problem 5,536.

Practical Brass Foundry Digest

By H. M. ST. JOHN

Chief Metallurgist, Detroit Lubricator Company; Associate Editor, METAL INDUSTRY.

Short Abstracts of Articles of Interest to Practical Non-Ferrous Foundrymen and Metallurgists.

Editor's Note: The two abstracts immediately below were published separately (September and August, respectively) instead of together, as they should have been. Since they are related (No. 2 refers back to No. 1) we are reprinting them in their proper order.

Alloys of Copper and Iron. K. M. Simpson and R. T. Banister, Metals & Alloys, Vol. 7, page 88 (April, 1936).

The authors describe an extended investigation of alloys varying from 85 per cent copper, 15 per cent iron, to 85 per cent iron, 15 per cent copper, with special attention to the 50-50 alloy. Intricate castings were successfully produced from this alloy, melted in a high frequency induction furnace in order to avoid contamination. The solidification shrinkage is very large and must be compensated by shrink heads similar in volume to those used for monel. In wrought material electrical conductivity comparable to brass was obtained.

Some Alloys of Copper and Iron. Earle E. Schumacher and Alexander G. Souden. Metals & Alloys, Vol. 7, page 95. (April, 1936.)

Without any special reference to casting, this article adds to the information noted in the preceeding abstract on wrought materials, both cold-worked and heat treated. The best combination of electrical and tensile properties is obtained at 50 per cent copper, 50 per cent iron, aged at 500° C. (868° F.). The corrosion resistance is not particularly good.

An Investigation of the Durability of Molding Sands. Carl H. Casberg and Carl E. Schubert. Univ. of Illinois Eng. Exp. Station Bull. No. 281 (April 21st, 1936).

Two natural (Albany and Mulberry Grove) and two synthetic sands were tested; the latter were prepared by adding Ohio clay, in one case, and bentonite clay, in the other, to silica sand. The mold test, the oven test and the hydration and dehydration test (all of which are described) were used. Results are illustrated by tables and graphs. As the tests progressed both natural sands and the bentonite sand gradually lost strength and gained permeability. The Ohio clay synthetic sand also gained in permeability but at first also gained in green strength, due to the breaking down of large clay particles into smaller ones. The green strength of this sand reached a peak and then declined. Changes in dry strength were independent of particle size and were probably governed by the dehydration resistance of the principal mineral constituent. In all cases the grain sizes of the sands were reduced and their size distribution altered. It was proven that all of the sands could be rebonded with clay and their use for molding purposes continued. It is judged impossible to accurately predict the life of a molding sand by any of the three test methods used.

Brass Foundry Melting Department Is Well Ventilated. Anon. Foundry. Vol. 64, May, 1936, page 48.

Description of the plant of the Superior Bronze Corporation, Erie, Pa., Monel metal, nickel and other high-temperature alloys are melted in Detroit electric furnaces, brass and aluminum in oil-fired pit furnaces. Cleanliness and ventilation are emphasized.

Non-ferrous Casting Alloys of High Strength. A. J. Murphy. Trans. Amer. Foundrymen's Assoc. Vol. 7, page 369 (April, 1936).

The 1935 official exchange paper from the Institute of British Foundrymen. Non-ferrous castings offer a wide range of physical properties, corrosion resistance, etc. The alloys discussed include manganese bronze, aluminum bronze, silicon-monel metal, the zinc-base and aluminum-base die casting alloys, and the age-hardening aluminum and magnesium alloys. The discussion brings out several points of difference between British and American practice.

West Coast Shop Makes Castings in Wide Variety. Pat Dwyer, Foundry, Vol. 64, May, 1936, page 43.

Describes plant of the Enterprise Foundry Corp., San Francisco. Steel, iron, bronze and other non-ferrous alloy castings are made. In the non-ferrous foundry, crucible furnaces, direct-flame furnaces and one oil-fired rotating furnace of novel construction are employed. Occasionally, for a very large casting, bronze is melted in one of the iron-foundry cupolas.

Aluminum-Magnesium Alloys. Pierre Vachet. Aluminum and Non-Ferrous Review, Vol. 1, page 301 (April, 1936).

A paper presented at the International Congress of Mines, Metallurgy and Applied Geology, Paris, October, 1935. An elaborate discussion with many tables and diagrams, including rather brief reference to the casting alloys.

The New Barronia Foundry at Gunnersbury. Anon, Aluminum and Non-Ferrous Review. Vol. 1, page 320 (April, 1936).

Describes a plant which specializes in corrosion-resisting bronzes and nickel-lead bronzes, melted in oil-fired crucible furnaces.

The Production of Zinc Alloy Die-Castings in U. S. A. Herbert Chase, Metal Ind. (London). Vol. 48, page 529, May 8th, 1936.

Describes plant and methods of the Schultz Die Casting Co. of Toledo, Ohio. The casting pressure used averages about 1500 lbs. per sq. in., the optimum temperature about 770° F, automatically controlled to plus or minus 5° F. Sections as thin as 0.025 inch are not uncommon.

Review of the Fields in Which Zinc Die Castings Are Used. Part I. Herbert Chase, Metal Ind. (London). Vol. 48, page 582, May 22nd, 1936.

The largest application of zinc die castings is for automobile parts and accessories, instrument parts and the like, although this type of casting has penetrated into every branch of the metal-working industry.

The Properties and Uses of Lead. R. S. Russell, Metal Ind. (London). Vol. 48, page 585, May 22nd, 1936.

The usual metallurgical tests for physical properties cannot be employed in the case of lead because of its softness and weakness; special equipment must be used. Using the Haigh machine the fatigue limit has been determined as plus or minus 0.18 tons per sq. in., but considerably higher if the test piece was covered with a film of oil. Increasing temperature lowers fatigue resistance as do certain corrosive influences. Creep, grain size and the rate of crystallization after cold work are also discussed. The effect of creep is such that structural lead in a sulphuric-acid plant should not be subjected to more than 100 lbs. per sq. in. In casting, lead should be poured quietly at the lowest possible temperature to prevent absorption of oxygen. Various important alloys of lead are discussed. 36 references are cited.

Variation in the Price of Base Metals. Robert Annam. Metal Ind. (London). Vol. 48, page 611, May 29th, 1936.

Presidential address to the Institution of Mining and Metallurgy, dealing with estimated demand, production costs, artificial restriction of production, as applied specifically to the more important non-ferrous metals.

New Patents

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

A Review of Current United States Patents of Interest

2,005,540. June 18, 1935. **Process of Treating Molten Metal.** Edward P. Fleming, Salt Lake City, Utah, and Sidney L. Palmer, San Francisco, Calif., assignors to American Smelting and Refining Company, New York, N. Y.

2,005,776. June 25, 1935. **Device for Spraying Paints, Lacquers, and Other Liquids.** Austin H. Downs, Newark, N. J., assignor to Eclipse Air Brush Company, Inc., Newark, N. J.

2,005,780. June 25, 1935. **Material for Providing Metal With a Paint Receptive Surface.** James H. Gravell, Elkins Park, Pa., assignor to American Chemical Paint Company, Ambler, Pa.

2,006,148. June 25, 1935. **Muffle for Use in Connection With the Casting of Precious Metals.** Karl Plaschka, Vienna, Austria.

2,006,256. June 25, 1935. **Treating Scrap Storage Battery Plates and Lead-Bearing Materials of Similar Composition.** Jesse O. Betterton and Charles W. Hanson, Metuchen, N. J., assignors to American Smelting and Refining Company, New York.

2,006,257. June 25, 1935. **Smelting Scrap Battery Plates and the Like.** Jesse O. Betterton, Metuchen, N. J., assignor to American Smelting and Refining Company, New York.

2,006,553. July 2, 1935. **Electroplated Articles and Method of Making Same.** Paul M. Hennegan, Cincinnati, Ohio.

2,006,565. July 2, 1935. **Magnesium Base Alloy.** Robert T. Wood, Cleveland, Ohio, assignor, by mesne assignments, to Magnesium Development Corporation, a corporation of Delaware.

2,006,598. July 2, 1935. **Corrosion-Resistant and Malleable Alloy.** Wolf Johannes Muller and Moritz Niessner, Vienna, Austria, assignors to Oesterreichische Dynamit Nobel Aktiengesellschaft, Vienna, Austria.

2,006,599. July 2, 1935. **Mechanically Workable Alloy.** Wolf Johannes Muller and Moritz Niessner, Vienna, Austria, assignors to Oesterreichische Dynamit Nobel Aktiengesellschaft, Vienna, Austria.

2,006,600. July 2, 1935. **Corrosion-Resistant and Malleable Alloy.** Wolf Johannes Muller and Moritz Niessner, Vienna, Austria, assignors to Oesterreichische Dynamit Nobel Aktiengesellschaft, Vienna, Austria.

2,006,601. July 2, 1935. **Corrosion-Resistant Mechanically Workable Alloy.** Wolf Johannes Muller and Moritz Niessner, Vienna, Austria, assignors to Oesterreichische Dynamit Nobel Aktiengesellschaft, Vienna, Austria.

2,006,652. July 2, 1935. **Apparatus for Investing Dental Casting Patterns.** David W. Phillips, Chicago, Ill.

2,006,891. July 2, 1935. **Apparatus and Method for Producing Metallic Dust.** William Hegmann, Centralia, Ill.

2,007,008. July 2, 1935. **Copper Zinc Alloy Containing Silicon and Iron.** Horace A. Staples, Plainfield, N. J., assignor to Phelps Dodge Copper Products Corporation, New York, N. Y.

2,007,009. July 2, 1935. **Annealing Furnace.** Horace A. Staples, Plainfield, N. J., assignor to Phelps Dodge Copper Products Corporation, New York, N. Y.

2,007,091. July 2, 1935. **Process for Obtaining Products of Great Value, Easily and Rapidly, by Electrolytic Means.** Hermann Kuppel and Louis Simeant, Clichy, France, assignors to Societe a Responsabilite Limitee Kuppel & Simeant, Clichy France.

2,007,027. July 2, 1935. **Apparatus and Process for the Manufacture of Zinc Dust.** John F. W. Schulze, Shaker Heights, Ohio, assignor to The Grasselli Chemical Company, Cleveland, Ohio.

2,007,092. July 2, 1935. **Manufacture of Antimony Compounds.** Walter Kussmaul, Basel, Switzerland, assignor to the firm Chemical Works Formerly Sandoz, Basel, Switzerland.

2,007,204. July 9, 1935. **Device for Cleaning and Electroplating Balls.** Harry Le Laurin and Albert L. Fry, Washington, D. C.

2,007,308. July 9, 1935. **Method of Soldering.** Adolf Sambraus, Berlin-Charlottenburg, Germany.

2,007,332. July 9, 1935. **Apparatus for the Distillation of Zinc and Other Volatile Metals.** Friedrich Johannsen, Magdeburg, Germany, assignor to Fried. Krupp Grusonwerk Aktiengesellschaft, Magdeburg-Buckau, Germany.

2,007,430. July 9, 1935. **Copper Alloy.** Frederick J. Maas, Chicago, Ill.

2,007,545. July 9, 1935. **Process for Treating Antimonial Lead.** Harold H. Monson, Omaha, Neb., assignor to American Smelting and Refining Company, New York.

2,008,188. July 16, 1935. **Method of Refining Aluminum.** Jacob J. Ripner, Cleveland Heights, Ohio.

2,008,282. July 16, 1935. **Chromium Plated Article and Method of Making the Same.** William H. Keen, Albany, N. Y.

2,008,302. July 16, 1935. **Process of Producing Alloys Containing Yttrium Metals of the Rare Earths.** James B. Grenagle, Baltimore, Md., assignor of one-half to William W. Varney, Baltimore, Md., and one-half to Universal Alloys, Incorporated, Baltimore, Md.

2,008,373. July 16, 1935. **Precipitating Copper from Solutions.** Henry A. Tobelmann, Salt Lake City, Utah.

2,008,529. July 16, 1935. **Zinc Base Alloy.** George L. Werley, Palmerton, Pa., assignor to The New Jersey Zinc Company, New York, N. Y.

2,008,641. July 16, 1935. **Lacquer, Enamel, Base Solution, and the Like.** Carl B. Gilbert, South Amboy, N. J., assignor to Hercules Powder Company, Wilmington, Del.

2,008,723. July 23, 1935. **Process of Preparing Abrasive or Polishing Tools.** Harry P. Mills, Toronto, Ontario, Canada, assignor to Bakelite Corporation, New York, N. Y.

2,008,731. July 23, 1935. **Treatment of Easily Oxidizable Alloys.** Philip T. Stroup, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

2,008,732. July 23, 1935. **Method of and Apparatus for Forming a Refractory Lining.** David L. Summey, deceased, late of Waterbury, Conn., by the Colonial Trust Company, Waterbury, Conn., and Richard P. Weeks Summey, New York, N. Y., executors, assignors to Scovill Manufacturing Company, Waterbury, Conn.

2,008,733. July 23, 1935. **Treatment of Coatings.** Martin Tosterud, Arnold, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

2,008,736. July 23, 1935. **Galvanizing Device.** Francis C. Williams, Detroit, Mich.

2,008,813. July 23, 1935. **Galvanizing Apparatus.** Albert Bradley, Sterling, and Edward T. Foley, Rock Falls, Ill., assignors to Northwestern Barb Wire Company, Sterling, Ill.

2,008,862. July 23, 1935. **Alloy.** Lorenzo S. Guetti, Athol, Mass.

2,008,879. July 23, 1935. **Method of Coating Articles.** Andrew C. Simmons, Peoria, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y.

2,008,939. July 23, 1935. **Method of and Material for Treating Metal.** John L. Tufts, Worcester, Mass.

2,009,278. July 23, 1935. **Process for Treating Metals to Prevent Spotting Out.** Oscar G. Smidel, Chicago, Ill.

2,009,290. July 23, 1935. **Art of Buffing.** Robert P. Cool, Clinton, Pa., assignor to Standard Steel Spring Company, a corporation of Pennsylvania.

Modern Equipment

New and Useful Devices, Metals, Machinery and Supplies.

"Free" Machining Monel Metal

By O. B. J. FRASER
Superintendent Technical Service
The International Nickel Co., Inc.

For the regular run of practice in the average shop equipped with modern tools, the machining of Monel Metal does not present any serious difficulty. Even in some of its hardest forms Monel Metal can be machined though cutting speeds must, of necessity, be reduced.

On certain types of production—especially screws and bolts—where automatic equipment is used, a problem enters because of the higher speeds involved. This problem, of course, is not peculiar to Monel Metal. It is shared by the other alloys which have high strength, toughness and the like, as common characteristics. Hence, it has been found necessary to produce those alloys in a special type for automatic lathe work.

The Huntington Works of The International Nickel Company, Inc., have developed a new type of Monel Metal for such purposes. This new type is known as "R" Monel Metal.

"R" Monel Metal is slightly less corrosion resistant than the ordinary forms of Monel Metal. A comparison of relative mechanical strengths will be found in the table below.

It is well known that special free-machining alloys of many types have been utilized for years, and nearly always has it been necessary to accept reductions in tensile strength and yield strength of as much as 15-20% from the values for the corresponding ordinary alloys. It is particularly noteworthy that the physical properties of "R" Monel Metal even though lower than of ordinary Monel Metal, are consistently higher than those of other free-machining alloys. This makes available the wide range of corrosion resistance of Monel Metal for applications where machining accounts for the largest single part of production cost.

"R" Monel Metal is produced in different grades designed for different sizes and for varying speeds of machining. In general, Grade 1 is for large sizes and for lathe work; Grade 2 for automatic machines; and Grade 3 only for special intricate machine work at high speeds. The table gives the range of properties for Grades 1 and 2, as compared to regular Monel Metal.

	Tensile Strength p. s. i.	Yield Strength (0.5% Set) p. s. i.	Elongation % in 2"	Brinell Hardness 3000 Kg.
COLD DRAWN "AS DRAWN" RODS AND BARS TO 3 INCHES				
Monel Metal	85-125,000	60-95,000	35-15	160-220
"R" Monel Metal (Grades 1 and 2)	80-115,000	50-90,000	35-15	145-210
HOT ROLLED RODS AND BARS TO 3 INCHES				
Monel Metal	80-95,000	40-65,000	45-30	130-170
"R" Monel Metal (Grades 1 and 2)	75-85,000	35-60,000	45-30	130-165

Industry is finding "R" Monel Metal to be a useful addition to the Monel Metal family. While it is not used where the highest possible strength is required, in many cases its lower strength is outweighed greatly by the advantages of reduced machining time. Many intricate automatically machined parts are being made out of it. It is not recommended for parts which must be subjected to severe cold work, for example, where more than a moderate amount of cold upsetting is required. Neither should it be used where hot working is required, as in forgings.

Improvements in Refractories

The Quigley Co., 56 W. 45th St., New York, announces that two patents covering an important advancement in refractories have been recently allowed to their chief technologist, J. M. Knote, and assigned to the company. These patents are briefly summarized.

Refractory Material and Method of Making Same. John M. Knote (Quigley Co. Inc.) U. S. 2,051,003, August 11, 1936. (November 28, 1933).

A process of manufacture and mixture for brick and monolithic refractory linings for furnaces and like purposes. This new chrome-magnesite refractory is a further improvement on the invention of Bronn, N. S. 1,780,114, Oct. 28, 1930 (Quigley Co. Inc.) It has two distinct fields: first, as a substitute for the older types of basic brick either chrome or magnesite; second, as a new refractory in places where silica and fire clay refractories had formerly been used; also in some cases displaces silicon-carbide and other super-refractories.

Refractory Composition, John M. Knote (Quigley Co. Inc.), U. S. 2,051,002, August 11, 1936. (December 23, 1932). A composition for lining of furnaces and mixture for making same. This is a chromite-dolomite refractory and is a further improvement on Bronn, U. S. 1,780,114 (Oct. 28, 1930).

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Reflector Unit; reduces power consumption, provides any color combination, gives increased distance to illuminated signs, running borders, marquees, etc. Climax Lamp, Inc., Canton, Ohio.

Research Metallographic Outfit; with complete equipment for work with bright field polarized light, and dark field. Bausch & Lomb Optical Co., Rochester, N. Y.

"Grip-Flex" Roller Bearing Couplings, for V-Belts. Shippert Mfg. Co., Dixon, Ill.

Wernco Sample Board of Architectural Metal Moldings. R. D. Werner Co., 21 E. 30th St., New York.

Metal Cutting Machine; semi-automatic, for cutting any light section material which can be cut with metal cutting saw blades. De Walt Products Corp., Lancaster, Pa.

Automatic Type "D-10" Polishing and Buffing Machine. An oscillating machine used in conjunction with the standard lathe for "out-of-round" work. Acme Mfg. Co., Detroit, Mich.

World's Largest Vulcanizer

To meet the ever increasing demand for rubber-lined tanks throughout the steel, chemical, electroplating and other acid handling industries, The B. F. Goodrich Company, Akron, Ohio, are now installing in their plant a new high pressure steam vulcanizer which is said to be 75 per cent larger than any similar unit now in use.

Latest and Largest Vulcanizer

The vulcanizer was fabricated in the shops of the Adamson Machine Company and the Biggs Boiler Works, Akron, Ohio. It weighs 110 tons, is 45 feet long and has a clear inside diameter of 15 feet. Designed to operate at 100 lb. steam pressure, this 65,000 gallon unit is of all-welded construction with the exception of the cast steel door rings and door head, which are attached with rivets.

It has a vertical rising door operated by screws with motor power. A standard gauge 90 lb. railroad track is installed in vulcanizer so that tanks can be moved in and out on specially constructed steel cars.

The primary advantage of this mammouth vulcanizer, according to Goodrich officials, is that it will be possible to complete large rubber lined tanks in considerably less time than was previously required.

New High Temperature Electric Furnace

A new 350-lb. furnace, Type LFC, for high temperature melting, is announced by Detroit Electric Furnace Company, 825 W. Elizabeth St., Detroit, Mich. It has been specially designed for melting copper, nickel, and alloy irons and steels.

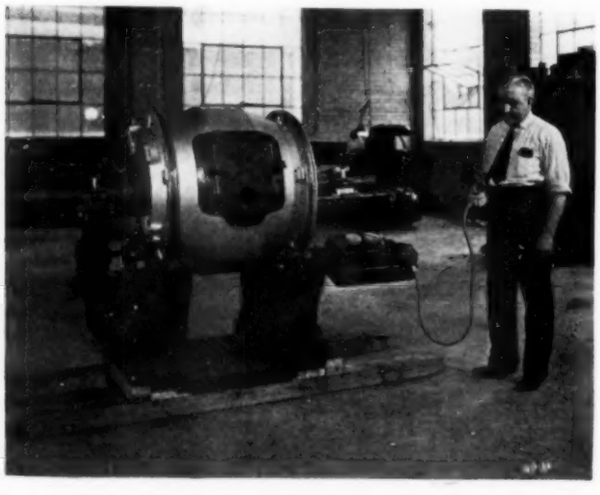
A major change from the model LFA which it replaces is that the arc at the center of the furnace is farther away from the refractory than at the ends of the shell. The new shell is of larger diameter around the central portion than at the ends.

A changed hearth design permits easier tapping and cleaning.

The new furnace is equipped with automatic rocking control, which is a recent development of the Company, and likewise with a remote pouring switch which can be operated at some distance from the unit. A magnetic brake motor is included as standard equipment on the rocking mechanism.

It is believed that the improvements in the refractory and shell will result in longer refractory life, reduced power and electrode consumption, and a decrease in metal loss in the highly volatile alloys.

The shell and refractory design are such that the metal is constantly brought back to the hottest part of the furnace, being that part immediately adjacent to the arc, so that there is a constant action to provide a uniform temperature throughout the bath.



New Style Detroit Electric Furnace for High Temperature Melting

New Plastic Refractories

Two new plastic refractory materials, known as Champion Furnace Patch and Champion Ramming Mix, especially developed for high temperature melting furnaces, are announced by the Champion Spark Plug Company and the Detroit Electric Furnace Company, 825 W. Elizabeth St., Detroit, Mich., from whom they may be obtained.

Ceramic engineers of Champion Spark Plug Company have developed a plasticizing process for Andalusite base Mullite. The results are available in two forms, a plastic ramming mix and a plastic patch or cement. The materials are similar chemically but differ in screen size, the ramming mix being of coarser texture, adapted for ramming deep patches or monolithic linings.

Champion refractories have been in use by scores of electric furnace users for a number of years. This recent improvement lowers the labor cost of the installation and secures for the user a better and longer lasting refractory. Prices of the new refractory have also been reduced.

Plastic Mix and Plastic Patch have been field tested in a number of difficult melting operations. Uniformly favorable results have been reported by users.

New Lathe Grinder

A new "Spee-Dee" No. 11 lathe grinder has been added to the line of the Dumore Co., Racine, Wisc. This new grinder is recommended for attachment to almost any machine tool, such as milling machines, planers, lathes, shapers and universal grinding machines. The tool, it is stated, will swing a 2" straight wheel for almost any kind of external grinding job, will grind internal holes ½" in diameter to a depth of 2½" and is also capable of grinding smaller diameters 1" deep. The grinder is driven by 1/5 hp. motor. Grinding spindle operates at 6000 R.P.M. for external, and 30,000 R.P.M. for internal work. Equipment includes 2 straight wheels, 3 mounted, and a ⅛" chuck.

Dumore No. 11 Lathe Grinder

Copper Hot Water Alloy

With the development of Arcoloy, a new patented metal used for the manufacture of range boilers and storage tanks, American Radiator Company, 40 W. 40th St., New York, announce the completion of the all-copper domestic hot water supply system. This development follows the introduction by this company within the past two years of a complete line of copper fittings for the complete copper in heating installation and it makes possible the use of a copper storage tank in radiator conditioning installations that include a domestic hot water supply.

Arcoloy range boilers and storage tanks for domestic hot water are made of 95% pure copper with silicon, phosphor and other elements added to make a metal alloy which develops a corrosion-resisting skin when contacted by acids or alkalis. Arcoloy is said to have a higher resistance to ordinary corrosive agents than pure copper.

The rated gallon capacity of Arcoloy storage tanks is 25, 30, 40, 50, 60, 80 and 100 gallons, while the range boilers are made with 25, 30, and 40 gallon capacities. All the tappings of both the boiler and storage tank are 1 inch, iron pipe size.

Developed in the laboratories of the Products Development Division of the American Radiator Company, Arcoloy tanks and boilers have been field and laboratory tested for the past two years for resistance to corrosive material and for tensile strength. Sulphuric, nitric and other volatile acids and alkaline agents had practically no effect on the metal, and the tensile strength for ordinary boiler purposes averages from 55,000 to 65,000 pounds per square inch.

In all Arcoloy tanks and boilers no solder or any other metal is used in the construction. The tanks and boilers, guaranteed for 20 years against all normal water conditions and use, are electrically welded with Arcoloy welding rod and the spuds are made from forged Arcoloy.

Color harmony or the resemblance of Arcoloy to the copper pipe and fittings which connect it into the hot water supply system has an immediate appeal to prospective customers, it was pointed out. Arcoloy tanks and boilers have a burnished finish and are supplied with a light coat of lacquer which acts as a protective coat for this finish. A special water proof bag of soft fibre material is provided to completely encase the tank and protect the high lacquer finish during transportation and installation.

Floor and ceiling plates, made especially for copper pipe sizes to give a finished appearance to pipe lines where the pipe is run into the wall, floor or ceiling, are now available through all jobbers, according to an announcement by American Radiator Company. Made with a non-tarnish chrome finish, the floor and ceiling plates employ a special spring feature that holds the plate in place without a vibrating rattle.

Arcoloy, the new metal developed by the American Radiator Company for hot water storage tanks and range boilers

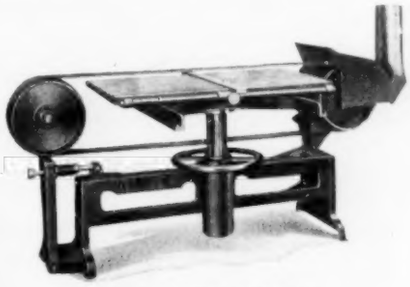
New Copper Alloy

A new copper alloy has been developed by the Hackett Brass Foundry, 6553 Woodward Ave., Detroit, Mich., called Hackett K-Copper. This alloy is said to combine the physical properties of steel and bronze with the high electrical and heat conductivity of copper. It is stated that it has the same properties as copper in corrosion resistance, coefficient of expansion, coefficient of resistivity and modulus of elasticity; hardness, 70 to 80 Rockwell B; 125 to 150 Brinell; ultimate strength 70,000 lb. per sq. in.; elongation approximately 20%; reduction in area 50%; electrical conductivity in drawn rod, 83% that of pure drawn copper; in forged form 75% to 85% that of forged copper.

Hackett K-Copper is available in bars, forgings, castings and welding tips. It is recommended strongly for welding requirements because of its high softening point and wear resistance.

Belt Grinder and Polisher

A self-contained polisher and grinder, said to be compact, easy to operate and efficient, has been placed on the market by the Oliver Machinery Co., Grand Rapids, Mich. It is recommended especially for grinding and polishing bronze tablets, aluminum castings, brass castings, etc. It will handle work up to



Oliver Belt Grinder

46" long and 26" wide, polished at one setting. Wider work can be handled by setting the material over on the table. The abrasive belt pulleys are 14" in diameter, 5" face made of aluminum and faced with rubber tire. Power is provided by a 2 H.P. motor fitted with a special safety first switch. A suitably enclosed dust hood is furnished over the driving pulley, with connection pipe which leads to the dust collecting system. Floor space required is 7' 2" in length by 3' 8" in width.

Recording, Controlling Pyrometer

The C. J. Tagliabue Mfg. Co. of Brooklyn, N. Y., manufacturers of Indicating, Recording and Controlling instruments for temperature, pressure, level, flow, etc., have recently announced a new 2- and 3-Position Recording Controlling Pyrometer.

Tag Recording Controlling Pyrometer

The extreme simplicity of this instrument is said to be the result of the exclusive TAG photoelectric balancing method. There are fewer moving parts due to the absence of any reciprocating balancing or control arms or cams.

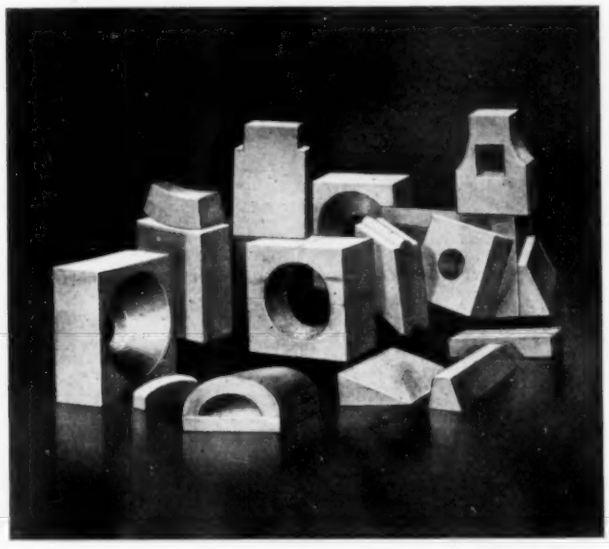
Control is accomplished by movement of the recording carriage with its ink stylus above or below the control contact assembly. Two of the many exclusive features of this instrument are its control action which is independent of the chart drive and its inherent protection against power failure.

A large scale clearly indicates the actual temperature at any time and is easily read from a distance. The record is made with red ink supplied by a pen with a large reservoir capable of holding a three month, or longer, supply. The pen itself is made of a transparent molded material and can be easily filled or removed for cleaning.

This instrument embodies all the other modern instrument refinements that are found in the complete line of TAG Potentiometer Pyrometers. They are completely described in the TAG Pyrometer Catalog No. 1101B which will be sent on request.

Castable Refractory

The Quigley Company, Inc., 56 W. 45th St., New York City, are manufacturers of Cast-Refract, a time and labor saving castable refractory for making special shapes, monolithic furnace linings, door linings, door arches and jambs, etc. Cast-Refract, it is stated, is a high grade refractory concrete, practically spall-proof. The method of using is simply to mix it with water on the job and shovel or pour into forms, like concrete; no cutting or ramming. It is ready to use in 24 hours. Temperature limit is 2600 degrees F.

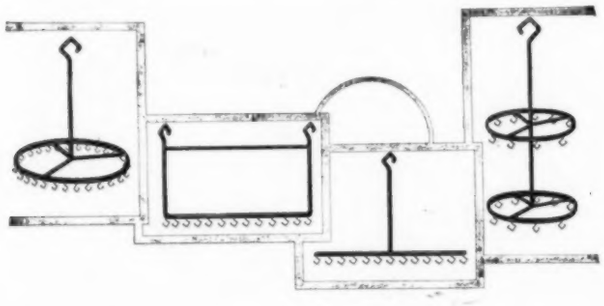


Shapes in Cast Refract"

Special Insulated Plating Racks

A special type of plating rack called, SpecOrak, has been developed by the Special Chemicals Corp., 30 Irving Place, New York City. All metal parts of this type of rack are completely covered with a thick coating of special insulation that, it is stated, is not affected by any ot the plating solutions, either acid or alkali. No metal is deposited on the racks, thus saving metal and current, and keeping refining losses down to an absolute minimum.

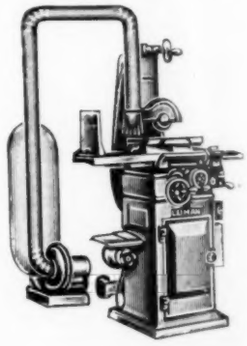
The racks are recommended for a wide variety of solutions including the precious metals, rhodium, gold, silver, etc. All standard racks are supplied with hook "C" as illustrated.



SpecOrack Specially Insulated Plating Racks

Dust Collector

Leiman Bros. Inc., 146-181 Christie St., Newark, N. J., are the manufacturers of a surface grinder dust collector, designed and installable as a unit for individual machines. This unit occupies a space of 11" x 13" and weighs 55 pounds. It consists of a suction blower, motor driven with piping



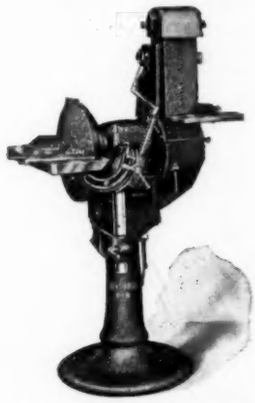
Leiman Dust Collector

connections to the surface grinder and to the dust disposal bag.

Full instructions are provided for installation. The unit can be placed on the floor, or on a shelf on a nearby post or wall, or it can be suspended from the ceiling. It can be plugged into any lamp socket of alternating current, 60 cycle, single phase. Other current can be provided for.

15" Disc Grinder

A new 15" disc grinder has been designed by the Oliver Machinery Co., Grand Rapids, Mich., for circular work up to 15" in diameter and duplicating work up to 7" wide. The machine is said to be very economical for accurate



Oliver 15" Disc Grinder

grinding and finishing segments, angles for built-up work, taper work, etc.

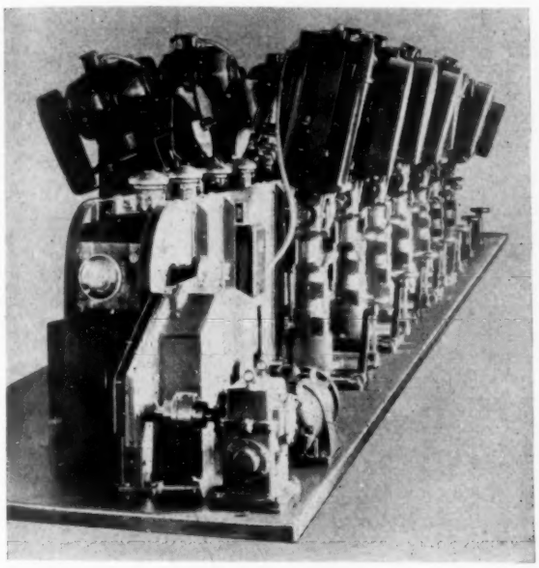
The table which is 9¼" wide by 21" long has a groove to take an angle gauge and circle, segment and duplicating gauge. A graduated index marks the exact angle of the tilt of the table from 45 degrees down to 25 degrees up.

For metal grinding and polishing emery cloth or Aloxite discs can be used.

Large Production Automatic Polishing and Buffing Machine

A new straight line automatic polishing and buffing machine has been developed by the Packer Machine Co., Meriden, Conn. This machine was built to take parts like steel hub caps and in successive steps, polish them to a mirror finish. The work is divided between 14 separate polishing heads, and the rate at which the work moves through the machine is adjustable, as is also the speed of rotation of the work while in contact with the polishing wheel. Consequently, each of the polishing heads is adjustable; also the machine as a whole is adjustable, in order that it may be adapted to a variety of products.

Each of the polishing heads is operated by a totally enclosed, fan-cooled induction type motor; 10 at 7½ hp. and 4 at 10 hp. Three wheel speeds are obtainable at each head; each head has three positioning adjustments. The work is indexed and held accurately in each position, and is rotated at a uniform speed in order to present all surfaces to the polishing wheel. Rotating speed and index cycle are adjustable to accommodate different types of work.



Packer Straight Line Automatic Polishing and Buffing Machine

New Basic Chemical for Steel Cleaning

The place of alkaline salts in the cleaning of steel prior to tinning, electroplating, vitreous enameling, and painting has long been recognized. Since the early days of the steel fabricating and finishing industries, alkaline detergent solutions have been used for the removal of dirt, lubricating and buffing compounds, and whatever types of soil cannot be taken care of by "pickling" in acid.

Caustic soda, trisodium phosphate, soda ash (sodium carbonate), modified soda (a mixture of sodium carbonate and sodium bicarbonate), and causticized ash (a mixture of caustic soda and soda ash) were originally used for this purpose.

Later it was found that solutions of certain sodium silicates were excellent cleaners for steel. These silicate solutions were found to have the following desirable properties which have made them preferred in many places over the other types of alkalis:

1. They have a strong tendency to "wet" steel.

2. They emulsify grease and dirt found on the surfaces of the steel to be cleaned.

3. They hold such grease and dirt in a dispersed condition and prevent redeposition of it on the metal being cleaned.

4. They have a protective effect against steel. Steel cleaned with solutions of the silicates has a characteristically "brighter" appearance.

Commercial hydrated sodium metasilicate and commercial hydrated sodium sequisilicate were produced and made available to the metal cleaning industry.

These two chemicals, particularly the metasilicate, are valuable in the cleaning of soft metals such as tin and aluminum. However, it has been felt by many that if the orthosilicate could be produced it would be considerably more efficient than the other two salts for the cleaning of steel. The difficulty had been to manufacture sodium orthosilicate at low cost in a convenient form. Within the last few months this objective has been attained and anhydrous sodium orthosilicate is now being commercially produced as dry, white, free-flowing granules readily soluble in water by the Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa. The material contains 62.5% sodium oxide, approximately 95% of which is said to be available for detergent purposes in concentrations usual in steel cleaning.

This new heavy chemical, it is stated, has the excellent penetrating, wetting, and emulsifying power typical of all the silicates. Some points of superiority claimed for anhydrous sodium orthosilicate over other sodium silicates are:

1. **Quicker Action.** The orthosilicate gives a higher pH at a given concentration than does either the metasilicate or the sesquisilicate. The higher pH is desirable in order that acidic and fatty soil may be more quickly dissolved and saponified by the cleaning solution.

2. **Greater Lasting Power.** "Lasting power" is indicated by the percentage of sodium oxide available in alkaline solutions above the pH at which the solution becomes no longer effective for detergent work. Assuming that this pH is 10.0, the "lasting power" of anhydrous sodium orthosilicate is three times that of commercial hydrated sodium metasilicate; one and three quarters times that of commercial hydrated sesquisilicate; three and one half times that of soda ash; and seven times that of trisodium phosphate.

3. **Better Electrical Conductivity.** Solutions of a given concentration of anhydrous sodium orthosilicate are better electrical conductors than solutions of similar concentrations made with commercial hydrated sodium metasilicate or sesquisilicate. This point is valuable when the alkali is to be used in electrolytic cleaning. The orthosilicate solution allows more current to pass, thus permitting faster scrubbing action due to more rapid gassing.

4. **Freer Rinsing.** Solutions of anhydrous sodium orthosilicate of a given pH are more readily rinsed from steel than similar pH solutions made with metasilicates or sesquisilicates.

5. **Convenience.** Anhydrous sodium orthosilicate is in a more condensed form than the other commercially available silicates, thus making for lower shipping costs and greater ease of handling.

There are many heavy duty industrial cleaning operations for which the new chemical is recommended. However, the material is too strong for use of itself in places where its solutions will come in continued contact with tin or aluminum.

Heat Resisting Vehicle

Some time ago, research was started with a view to formulating a vehicle for aluminum paste or powder, which would produce a coating of maximum heat resistance. Ordinary aluminum vehicles would not stand up beyond a temperature of 500° F. and formulations were begun in an effort to produce a

vehicle that would help the aluminum to hold on even when the surface on which it was used became red hot.

The Hilo Varnish Corporation Laboratories, 42-60 Stewart Ave., Brooklyn, N. Y., have produced "Hilume Heat Resisting Vehicle" which approaches a new high in heat resistance. Tests of this vehicle were made as follows:

Clean steel plates were sprayed with a mixture of two pounds of aluminum paste to one gallon of Hilume Vehicle. Some of the plates were air dried while others were baked at 200° F. for 2 hours. After drying the plates were held over an open flame until the metal became red hot. The red hot plates were then plunged into cold water. Despite the severity of this test, the aluminum finish hung on tenaciously with absolutely no signs of flaking or peeling.

The extreme heat resistance of Hilume Vehicle is said to make it an ideal article for use on boiler fronts, auto exhaust manifolds, airplane motor cylinder heads, radiators, steam pipes and many other surfaces which are subject to unusually high heat.

The Nucast 99% plus Nickel Anode

By DR. H. F. MEIER

Apothecaries Hall Co.
Waterbury, Conn.

The Nucast 99% nickel anode has been introduced by Apothecaries Hall Co., Waterbury, Conn., to fill the existent need of a cast anode having the desirable properties of high purity, uniformity, and economy of operation. 95/97% anodes have been used successfully but in recent years advances in nickel plating methods have demonstrated the necessity for high purity anodes. Certain types of high purity anodes now being used leave something to be desired. Therefore, after extensive research and experimentation the procedure outlined has been adapted as best producing the results desired.

A typical analysis is given below:—

Nickel	99.700%	Sulfur	.004%
Iron	.053	Copper	.032
Carbon	.013	Oxygen	.200
Silicon	.006		

The percentage of oxygen may vary from 0.10 to 0.24%; sulphur may vary from 0.004 to 0.01%.

Corrosion studies have been made in a cold solution and a hot Watts solution. (See table below).

	Hot Watts Solution	Cold Solution
$NiSO_4.7H_2O$	28.5 ozs./gal.	16 ozs./gal.
$NiCL_2.6H_2O$	6 ozs./gal.	2 ozs./gal.
H_3BO_3	4 ozs./gal.	2 ozs./gal.
NH_4CL	.....	2 ozs./gal.
Temperature	110-130°F	cold
Current density	15-25 amps. per sq. ft.	10 amps. per sq. ft.
Time of corrosion	several days	several days

A rocking type Detroit electric furnace is employed in melting cathode nickel in the manufacture of the Nucast anode. By a special process the proper amount of oxygen is introduced into the melt so as to effect a uniform distribution of nickel oxide. A calculated quantity of nickel sulfide is added to the furnace during the melting process in order to promote better anode corrosion. A deoxidizer is added to the ladle to facilitate the pouring operation as well as to minimize the amount of nickel sulfide in the melt.

At a fixed temperature above the melting point of the nickel-nickel oxide eutectic composition, the metal is poured into chill molds. This temperature is the most advantageous to aid in producing a fine grain structure and at the same time to give a smooth surface. At this pouring temperature the structure is maintained more uniform and hence a more even distribution of sulfide is promoted at the grain boundry. This fact has been verified by a metallographic study of cross sections of the anode.

Metallic losses are low due to an advantageous distribution of sulfur and oxygen within the anode. It has been found that some anodes of slightly coarser grain structure have lower metallic losses than those of very fine grain structure. This is influenced by anode current density, acidity, temperature, position of anodes, position of work, and many other variable factors. Hence no real conclusion can be drawn on the relation of structure and complex electrochemical corrosion processes.

Many platers have found these anodes to be more soluble in solution and to give faster performance with high efficiency; these facts were confirmed by laboratory experiments on anode and cathode efficiencies. A series of tests with the above cold plating solution were made with the Nucast anode by comparison with other anodes on the market. A high value of Nucast anode efficiency was established. Dependable action in plating is produced by the high uniformity of Nucast anodes. Corrosion is fast and even with anode surfaces remaining hard and firm until exhausted.

How evenly these anodes corrode is shown by illustrations contained in a new brochure recently brought out by the manufacturers of the 99% plus Nucast nickel anodes. These brochures will be gladly furnished upon request.

The Lea String Brush

The Lea Manufacturing Co. of Waterbury, Conn., has developed a type of brush known as the "Lea String Brush" for use in conjunction with the Lea method of metal finishing. In the past it has been necessary to use cloth buffs for producing satin and Butler finishes by the Lea method. With this development articles having contours and ornamentations can be even more quickly and more economically finished. This brush is more pliable than a cloth buffing wheel and therefore permits the flexible surface to get into the contours of intricate shapes.

With the Lea string brush, finishes can be produced ranging from a very dull satin to a bright Butler.

Oil Extractor

The National Separator Co., Grafton St., Worcester, Mass., has modernized its line of separators, centrifugals, oil extractors and dryers. The oil extractor for recovering cutting oil from saturated chips is made in several sizes and types.

Exclusive features claimed for this equipment are: the outboard, horizontal motor drive, without belts, through a compensating shaft; light, removable chip pans, with and without the center sleeve post; oil filtering attachment with all known safety features; a pan cover lifting device.

New Brazing Alloy

Improvements and refinements in manufacturing Phos-Copper brazing alloy have been announced by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. They recommend the new alloy especially for refrigerator parts, etc. where leak proof joints are a necessity.

An alloy of phosphorous and copper developed to replace expensive silver solders, Phos-Copper has, it is stated, a relatively low melting point, high tensile strength and excellent penetration. Some of the other desirable properties claimed include absolute uniformity of alloy, self fluxing properties for most applications, high ductility, high fatigue resistance, high corrosion resistance, high electrical conductivity, high fluidity at brazing temperature, and economical to use. Also, brazed joints may be electroplated or tinned.

Phos-Copper is available in many sizes and shapes, including rod, ribbon, washers, strip, and other shapes. Standard rods are three feet in length with diameters as follows: 1/16", 3/32", ⅛", 3/16", ¼". Ribbon is .015" thick by 1.25" wide. Other shapes for special applications are available.

It is applicable to all kinds of copper and copper alloy joints where strength, or gas and liquid tight joints are required, such as bus bar structures, copper tanks, cooling coils, electrical connections, radiators, refrigerators, terminal lugs, water heaters, copper piping, air conditioning systems, and copper smithing.

Phos-Copper is applied essentially the same as soft solders, except Phos-Copper requires a higher temperature. It melts at 707° C., a temperature which can easily be obtained by an oxy-acetylene torch, incandescent brazing or carbon arc. At brazing temperatures it is said to flow freely over the surface, facilitating the brazing of hard-to-get-at joints and to be self fluxing when used on ordinary copper work where it is not necessary to secure gas or liquid tight joints.

Primers for Galvanized Iron and Also for Non-Spangled Galvanized Iron

For a good many years it has been recognized that it is difficult to make paint adhere to galvanized iron. Good jobs have been obtained and for some inexplicable reason some jobs have failed badly. These failures frequently occur during alternations of wet and cold weather, when one may notice galvanized iron advertising signs shedding paint to a point that makes further removal almost unnecessary prior to the application of a new job. On a number of different occasions one could walk down the street on a cold winter morning and find that whole blocks of galvanized iron dormer windows, located in row houses, had shed their paint during the previous twenty-four hours.

A number of different methods have been used to improve adhesion, including weathering or chemical treatments which etched the surface. Although such treatments often help, they sometimes hinder adhesion by leaving behind them a layer of chemical reaction products which prevent the paint from reaching the zinc.

E. I. du Pont de Nemours & Company, Wilmington, Del., have recently, however, placed on the market a primer which is said to have a remarkably good record of satisfactory performance for this purpose. Like the best of the earlier galvanized iron primers it carries zinc dust, which is present in an attached container and which is to be mixed with the balance of the paint prior to application.

The principal difference between this primer and the older primers carrying zinc dust is the use of a special vehicle which, together with the pigment, forms a combination which, in general, it is stated, adheres satisfactorily over a long period of time and under adverse conditions to galvanized iron. It may be finished with any ordinary paint of satisfactory durability.

It must be recognized, however, that no galvanized iron primer can be considered absolutely foolproof. The zinc itself is so reactive that if weathered in acid areas or if washed with some of these etching type preparations, a layer of reaction product may be present which will prevent the primer from reaching the zinc-coated surface. Under these conditions a careful cleaning job is necessary, such as scrubbing with an organic solvent or soap and water followed by complete removal of the soap with excess water.

The finishing of non-spangled galvanized iron has presented a serious problem to the industry ever since the introduction of this substrate. This problem has been approached in the main from two definite angles; first, the treatment of the metal, and second, through the improvement of the finishing system.

There is no doubt but that the finishing of non-spangled galvanized iron has been made less difficult due to the efforts of the industry in modifying the surface to be finished. However, even after the marked advances in the surface preparation of non-spangled galvanized iron, the trade was still confronted with the fact that the average life of finishes over this metal was very short as compared with that of finishes over steel.

The du Pont Company, through its Research Division, was challenged by this problem and, as a result of considerable investigation and practical testing in the field, is now, they state, in a position to offer to the trade a finishing system which gives satisfactory results over non-spangled galvanized iron.

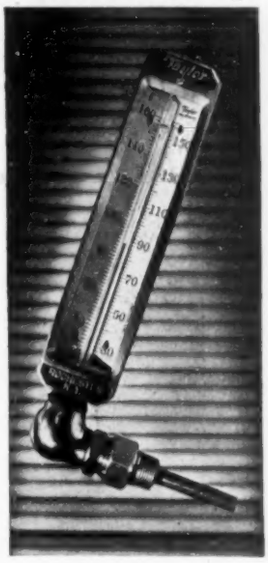
The finishing system which is being offered has as its basic unit a new line of primers—the Preparakotes. It is the unique qualities of the Preparakotes that have made it possible for the du Pont Company to say that it has solved the difficult problem of finishing non-spangled galvanized iron. The adhesion of the Preparakotes to metals is said to be remarkable in that it is good not only to steel but also to metals which have been classified as difficult to finish, such as the substrate in question and other non-ferrous metals. Then, too, the adhesion of the Preparakotes does not decrease on aging as is typical of all standard primers.

In addition, the Preparakotes are said to be primers that fill and can be sanded, thus eliminating the necessity of using a different product as the surfacer. Another unusual characteristic claimed for the Preparakotes is that they air dry satisfactorily for dry sanding and recoating in four hours; also that they are very resistant to peeling, blistering, and failure by cold cracking. Standard top coats such as Duco or Automotive Dulux are used over the Preparakotes to complete the finishing system for non-spangled galvanized iron.

Improved Readability of Thermometers

Mercury-in-glass industrial thermometers always have been notoriously difficult to read except at very close range and under most favorable lighting conditions. That characteristic not only discouraged frequent readings, but was responsible for many erroneous readings as well. The Taylor Instrument Companies, Rochester, New York, claim to have corrected this difficulty in a fundamental manner by a uniquely designed thermometer tube which is extremely easy to read.

This new thermometer tubing, known as Binoc, is described as an outstanding achievement of modern optical science. Advantages of the design include: more than twice the accustomed angle of vision combined with high magnification of the mercury column; binocular vision (i.e., readability with both eyes) at normal or greater than normal distances, whereas it previously was necessary to stoop and squint. Triple-lens construction gathers three times as much light and concentrates it behind the mercury column, making the column stand out in sharp relief. Confusing empty-bore reflections are eliminated by the scientifically determined lens angle and extended opaque background.



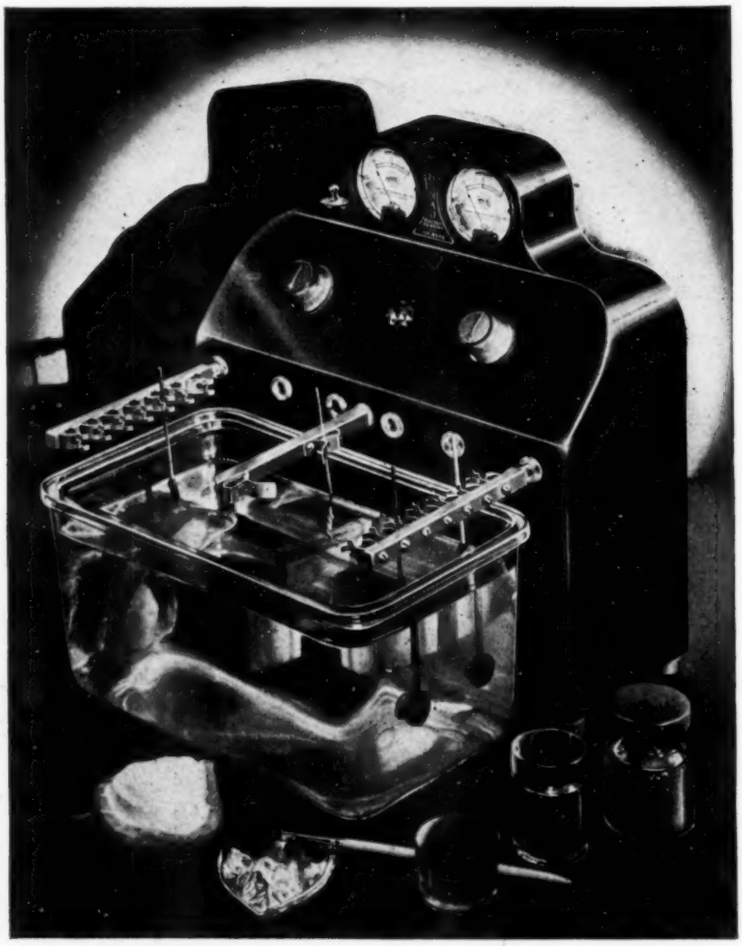
Taylor "Binoc" Thermometer

The legibility of these new Taylor Industrial Thermometers is further improved by the bold, black numerals and graduations on the cream-tinted, non-tarnishing scale. The Taylor line of thermometers of this type will be available in all of the popular straight, angle and handled forms. Bulletin 99023 describes this new development.

Dentist's Electroforming Machine

A new electroforming machine for use by dentists has been built by the Hanau Engineering Company, 951 W. Ferry St., Buffalo, N. Y. This machine, it is claimed, will produce metal models from the inlay or jacket crown, partial and full impressions, or form a silver denture base, each precisely as faithful to anatomical contour as the impression itself.

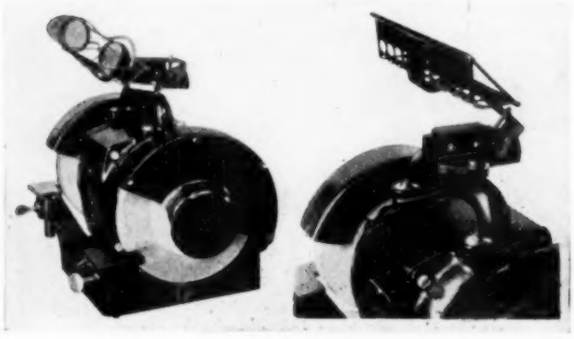
The company supplies solutions and anodes for copper, cadmium, silver, gold, rhodium and also the metallizing materials and utensils.



Hanau "Senior" Electric-Former

Novel Safety Device

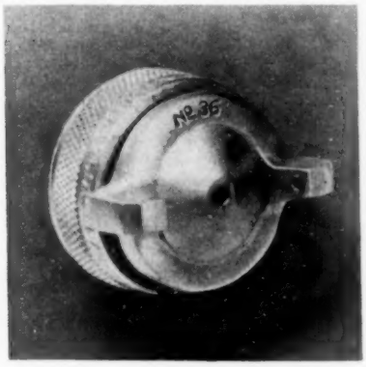
The safety-minded manufacturers, C. F. Burgess Laboratories, Inc., Freeport, Illinois, have enforced the use of goggles in their plant by a rather novel device mounted on several types of grinding machines used in their shops. This device consists of a goggles tray or holder on which the goggles are placed when not in use. One end of this tray rests upon the actuating plunger of a compact and sensitive electric switch (Burgess Micro Switch) connected in the grinder motor circuit. As long as the goggles remain in the tray, their weight is sufficient to maintain the switch in an "open" position so that the grinder motor will not start. When the operator removes the goggles and puts them on, the weight on the switch is reduced and the switch snaps closed, starting up the grinder motor. With this scheme, the motor starts automatically when the goggles are removed, but will not start if they remain in the tray. Thus, the employer is sure that his workers' eyes are always adequately protected when they use the grinder.



Safety Device to Insure Use of Goggles

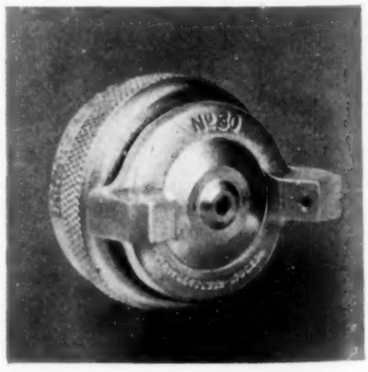
Spray Equipment for Use with Synthetic Materials

The new synthetic materials have numerous characteristics quite different from lacquer. Among these are that synthetics are more viscous and slower in drying than lacquers. Synthetic enamels produce a high gloss and are tougher than lacquer, and dry more rapidly than the old style enamels.



No. 36 Cap for Suction Feed; Pressure Not Over 60 Lbs.

Both synthetics and lacquers are wet when applied to the finished surface. Lacquers dry almost immediately after



No. 30 Cap for Suction or Gravity Feed

spraying, while a longer interval is required for synthetic materials to dry. Consequently synthetics have a greater tendency than lacquers to run or sag.

Due to the nature of synthetics, it is necessary first to apply a light coat, a little heavier than a mist coat. After

No. 76 Cap Pressure Feed for High Production

an interval, a heavier coat is then sprayed on. Higher air pressures than for lacquers are needed to break up and properly atomize the synthetics.

The high gloss of synthetic materials accentuates any surface or undercoat defects. This necessitates fine, even, full bodied application of both undercoats and finish coat. Synthetics, therefore, must be sprayed with spray guns that will finely atomize the material and apply it to the surface with uniform smoothness, and in such manner as to avoid runs and sags.

The development of synthetics consequently changed spraying conditions and requirements, for spray equipment designed for the application of lacquer was generally not satisfactory for use with synthetics. Progressive spray equipment manufacturers met the problem by improving the general quality of equipment, producing new spray guns with improved atomization, improved spray patterns, improved adjustments, easier handling and manipulation, and improved and more fool-proof design.

The newer types of spray guns are designed to spray modern finishing materials with greater efficiency, producing higher quality finishes with less effort and at lower cost. They are universal spray guns. With proper nozzle combinations they may be used with any sprayable material.

Larger air passages in the new spray guns permit a greater volume of air to be brought up to the spray head, or working end of the gun. There is less air pressure drop through the gun, and the proportion of air to material flow is increased.

The spray head has large port openings and a baffle arrangement which insures uniform distribution of air to the horns and center orifice of the air cap. This results in uniform atomization of material and a balanced uniform spray pattern.

Working conditions, products, surfaces and materials vary considerably and require the proper combination of air cap and fluid nozzle for maximum efficiency and highest quality finish. New style air caps have four or more air ports for synthetics, while the old style such as used for lacquer has only two air ports. Spray heads are supplied by the spray equipment manufacturer with the particular air cap and nozzle combination recommended for the kind of work being done, for the particular material feed in use and the speed of production required.

The improved multiple jet air caps produce better atomization, better spray patterns and more uniform application of material. They provide greater air volume, prevent split sprays at higher pressures, and produce even application instead of a heavy center type of pattern. The small nozzle size and consequent reduction of material flow saves material, provides greater air volume in proportion to material flow and prevents sags or runs.

Next in importance to the spray gun in producing high quality finishes is the air transformer. This equipment regulates the air pressure and allows only clear dry air to reach the spray gun, thus protecting the finish from defects.

The compressing unit must be of sufficient size (in cubic feet of air per minute) to keep the spray gun in continuous operation at the desired pressure. Maximum efficiency, speed and quality of finish cannot be expected of any spray gun unless the air compressing equipment constantly delivers the volume of air consumed by the air cap. The compressing unit must be capable of efficient and trouble-free service.

There is costly waste in the use of old, worn or obsolete compressing units, or in the continued use of out-of-date, inefficient spray guns. Such losses far exceed the cost of new, modern, improved equipment.

The diameter and length of the air hose used has a marked effect upon the efficient performance of a spray gun and the quality of finish it produces. Too often the spray gun is blamed for functioning improperly when the real cause is an inadequate supply of compressed air. Even considering the enlarged air passages in modern spray guns, this improvement is too frequently offset by the use of improper size air hose.

Information on spray guns for synthetic materials is available from The De Vilbiss Company, Toledo, Ohio.

New Catalogs

Abrasive Paper and Cloths. For the student and home craftsman. Behr-Manning Corp., Division of Norton Co., Troy, N. Y.

High Temperature Insulation Products. For all types of heated equipment. Armstrong Cork Co., Lancaster, Pa.

Finishes for Aluminum. A booklet to assist the users of aluminum in solving their finishing problems. It covers: Mechanical finishes—polishing, highlighting, scratch-brushing, satin finish, fluting, sand blasting and burnishing; Chemical Dip Finishes—frosted dip, reflector dip, etching and chemical oxide; Electrolytic Oxide Finishes—Alumilite finish, Alzak, anodic finishes in chromic acid; Electroplating on Aluminum—zinc plating, chromium directly on aluminum, nickel plating; Tests of Deposits; Alclad Products; Paint, Lacquer and Enamel finishes—effect of alloy composition, surface preparation, methods of application, priming paints, finishing coats, clear finishes, vitreous enamel. Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa.

The Answer to your Temperature Problem. Modern controllers that modernize temperature control. Brown Instrument Co., Wayne & Roberts Aves., Philadelphia, Pa.

Commercially Important Copper Alloys. General information in text form; tabular matter giving the more important physical and mechanical properties and data on the working, welding, and machining methods; tables of weights and dimensional tolerance. It covers coppers, brasses, lead bearing brasses, special brasses, tin bronzes (phosphor bronzes), conductivity bronzes, nickel silvers, cupro nickels and nickel aluminum bronzes, Olympic bronzes (silicon bronzes); suggestions for ordering; miscellaneous tables and index. Chase Brass & Copper Co., Waterbury, Conn.

Lacquers, Enamels, Bronzes and Spraying Apparatus. An attractively illustrated booklet covering all of the products of G. J. Nikolas & Co., 1227 W. Van Buren St., Chicago, Ill.

Degreasing Trial Offer. A four-page folder illustrating three of the standard Detrex Degreasers offered for trial. Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

Cleaning Before Rust-Proofing. Advantages of the Detrex method of solvent degreasing. Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich.

Metal Powders: aluminum, antimony, bismuth, brass, bronze, cadmium, chrominum, cobalt, copper, gold, iron, lead, manganese, molybdenum, nickel palladium, silicon, silver, tellurium, tin, titanium, vanadium, zinc. Charles Hardy, Inc., 415 Lexington Ave. New York.

How to Sharpen. A book for the mechanic, farmer, home craftsman and student. Behr-Manning Corp., Division of Norton Co., Troy, N. Y.

Mirror "54" Cleaner. To remove oil and grease prior to plating and enameling; also platers' compound for cleaning before plating nickel, copper, chromium, brass, die casting, etc. Standard Supply Co., P. O. Box 1198, New Haven, Conn.

Round Chart Recording Voltmeters and Ammeters. Bulletin 436. Bristol Co., Waterbury, Conn.

Special Equipment for the Process Industries; fabricated from aluminum, Monel metal, nickel, Everdur and steels. Edge Moor Iron Works, Edge Moor, Del.

Nichrome. Book R-36. An aid to those upon whom rests the responsibility for the proper selection of alloys used for electrical, mechanical and chemical purposes. Driver-Harris Co., Harrison, N. J.

Industrial Products. A 60-page book, profusely illustrated on high and low temperature insulation, roofing, etc. Johns-Manville, 22 E. 40th St., N. Y. City.

Research Illustrated. "Houghton on Lubrication." E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa.

Wheelabrator Multi-Rotary Table. Folder 33. American Foundry Equipment Co., 408 Byrkit St., Mishawaka, Ind.

Handbook of Design for Metal Parts for Porcelain Enameling. Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill.

Reflectance Test for Opaque White Porcelain Enamels. Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill.

Porcelain Enameled Signs. Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill.

Sales Manual for Porcelain Enamel. Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill.

Heavy Duty Black; Triple-A No. 20. For protecting steel against corrosion in industrial and railroad structures and equipment. Quigley Co. Inc., 56 W. 45th St., N. Y.

Arc Welding. The dawn of a gigantic industry. Milwaukee School of Engineering, 1020 N. Broadway, Milwaukee, Wis.

Associations and Societies

Electrochemical Society

Columbia University, New York

The fall 1936 meeting will be held at Niagara Falls, Canada, October 8-10. One of the features of this meeting will be a session on "What the Electric Furnace Has Done for Civilization." Among the papers which are already in print are:

Melting and Casting Metals in Vacuo by W. Rohn, Heraeus-Vacuumschmelze, Germany.

Electrodeposition of Molybdenum from Aqueous Solutions by W. P. Price and O. W. Brown, Indiana University.

Society of Mechanical Engineers

29 West 39th Street, New York, N. Y.

A remarkable symposium on Corrosion Resistant Metals in Design of Machinery and Equipment will be held as part of the American Society of Mechanical Engineers Annual Meeting in New York City, November 30 to December 4. The information presented is to be in compact form, of a practical nature, free from lengthy theoretical discussions but still sufficiently complete that when the different papers are assembled they will form a handy reference for the engineer of the subject of corrosion resistant metals.

The papers to be presented are as follows:

Introduction to Corrosion Resisting Metals—Dr. F. N. Speller, National Tube Co., Pittsburgh, Pa.

Alloys of Aluminum—E. H. Dix, Jr., Aluminum Company of America, New Kensington, Pa.

Nickel and Nickel-base Alloys—F. L. LaQue, The International Nickel Co., Inc., New York, N. Y.

Zinc in the Chemical Industries—E. A. Anderson, The New Jersey Zinc Company, Palmerton, Pa.

Lead—G. O. Hiers, National Lead Company, Brooklyn, N. Y.

Cast Iron in Chemical Equipment—Dr. H. L. Maxwell, E. I. du Pont de Nemours, Co., Inc., Wilmington, Del.

Copper and Copper-base Alloys—R. A. Wilkins, Revere Copper and Brass, Inc., Rome, N. Y.

Corrosion Resistant Steel (Stainless Type)—J. H. Critchett, Union Carbide and Carbon Research Laboratories, Inc., New York, N. Y.

The Committee drew up the following outline as a guide to the authors in the Symposium:

(1) Typical compositions (tabulated).

(2) Mechanical properties (tabulated).

(3) Available commercial forms, giving general information on whether the material is available in hot and cold rolled sheets, strip, bars, extruded, castings, forgings, etc. and some idea of the limiting sizes and gauges.

(4) Corrosive conditions for which the material is recommended as well as those for which it is not recommended. This information is to be presented as far as possible by means of tables, charts, or other means to present it in a condensed form. The following is a list of topics which should be covered as far as information is available in the corrosion data, giving some idea of its suitability, durability and range of rates of corrosion:

Atmosphere	Organic acids
Fresh water	Acid salts
Salt water	Alkaline salts
Neutral salts	Oxidizing acid salts
Mineral acids	Oxidizing alkaline salts
Oxidizing acids	Wet and Dry gases

(5) Information should be offered on recommended methods of fabrication, design, forming, joining, machining, etc.

(6) Typical examples of application in construction.

Porcelain Enamel Institute

612 N. Michigan Ave., Chicago, Ill.

The sixth annual meeting of the Porcelain Enamel Institute, national association of porcelain enamel and allied manufacturers, will be held October 1-2 at the Hotel Statler in Cleveland, Ohio. Leaders of the industry from all sections of the country are expected to attend.

The first day will be devoted to sectional meetings of the Institute's Educational Bureau and group meetings of various Institute divisions. The annual meeting proper will convene the following day.

In addition to the annual election of officers, an executive committee and a board of trustees for 1937, a full program has been developed. Among the speakers will be **George F. Taubeneck,** editor of **Electric Refrigeration News,** who will speak on **"What the Rest of the World Thinks About Porcelain Enamel"; Rudolph W. Staud** of the **Benjamin Electric Mfg. Co.,** Chicago, who will discuss the Robinson-Patman Act as it affects the porcelain enameling industry; **E. L. Lasier** of the **Titanium Alloy Mfg. Co.,** Niagara Falls, N. Y., who will present the Educational Bureau's proposal for 1937; **William Hogenson, Chicago Vitreous Enamel Product Co.; R. G. Calton, Tennessee Enamel Mfg. Co.; R. A. Weaver, Ferro Enamel Corp.,** Cleveland; **George S. Blome, Baltimore Enamel & Novelty Co.; Richard H. Turk, Porcelain Enamel & Mfg. Co.,** Baltimore; **Earle S. Smith, Toledo Porcelain Enamel Products Co.** and others.

Sectional reports regarding the Institute's Educational Bureau, which has been sponsoring an advertising campaign during the last two years and conducting technical and market research, will be presented, together with an outline of their programs for next year.

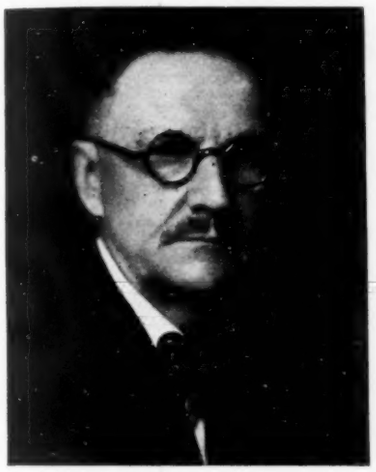
Present officers of the Porcelain Enamel Institute are: **R. G. Calton,** president; **F. E. Hodek, Jr.,** General Porcelain Enameling & Mfg. Co., Chicago, and **E. L. Lasier,** vice-presidents, and **William Hogenson,** treasurer.

Personals

Charles W. Cooper

Charles W. Cooper, brass roller for the American Brass Company, Waterbury, Conn., was given a testimonial dinner by foremen and rollers of the company, on August 14, 1936 on his retirement after 59 years of continuous service with the company.

Mr. Cooper was born in Waterbury, Connecticut, January 16, 1861 but has lived the greater part of his life on a



CHARLES W. COOPER

small farm in Watertown. Mr. Cooper comes from a long line of brass rollers, his grandfather being brought over from Birmingham, England, by a Mr. Holmes. (This Mr. Holmes later became a partner in the firm of Holmes, Booth & Hayden.) The voyage was in a sailing vessel taking eight weeks to cross the Atlantic. Mr. Holmes at that time was interested in a brass mill in the vicinity of Torrington. A few years later the Holmes, Booth and Hayden Company was formed in Waterbury and the grandfather of Charles W. Cooper was engaged as a brass roller. In fact, he was the only roller for several years, shifting around from breaking down to finishing as the work came along.

Charles W. Cooper's father was also born in England and served his apprenticeship as a roller at the Holmes, Booth & Hayden plant. In September, 1877, his son, Charles W. Cooper was apprenticed as a brass roller, and he has been with the company continuously for the past fifty-nine years, seeing the Holmes, Booth & Hayden Company merged with The American Brass Company and later with the Anaconda Company.

Mr. Cooper states that the Holmes, Booth & Hayden mill was powered by a steam engine, one of the very few in this part of the country. The engine in question was of an unusual type designed and built by a local engineer and fashioned somewhat on the plan of a marine engine. Mr. Cooper has witnessed many changes in the brass industry and recalls that for many years after serving his apprenticeship the mills had no equipment such as blocking or coiling machines, this operation being done by hand which was not difficult as 16" rolls were operated at not more than 16 revolutions per minute and it took 60 bars 4" wide to make 1,000 pounds.

Mr. Cooper has retired and lives with his family in the old homestead in Watertown. He is in unusually good health for a man of his years and his chief hobby is trap shooting. Mr. Cooper is a widower and his family consists of two sons and one daughter. One son is Assistant Superintendent of Schools on Long Island, New York, the other a toolmaker with the American Brass Company, and his daughter works in the General Office of the same company.

A. R. Ellis

A. R. Ellis has been elected president of the Pittsburgh Testing Laboratory, Pittsburgh, Pa.

Mr. Ellis was born and raised in Pittsburgh and educated in the Pittsburgh Public Schools. He was graduated from Cornell University, Ithaca, New York in 1905 with the degree of Civil Engineer. He entered employ of the Pittsburgh Testing Laboratory the same year, as a laboratory technician. Later he became an inspector of engineering materials and finally became Chief Engineer, in 1910. In 1917 Mr. Ellis was appointed Manager of the New York Branch. In 1918 he was made Assistant General Manager and in 1921, General Manager and Director. He was appointed Vice President and Director in 1929, and President and Director in 1936.

A. R. ELLIS

Mr. Ellis is a member of a number of technical and business associations and societies.

Robert W. McClurkin has been named president of the **Matthiessen & Hegeler Zinc Co.**, La Salle, Ill. He was formerly manager of the **Tonawanda Iron Corporation. Mr. McClurkin,** who is a member of the American Iron and Steel Institute, began his career as a chemist with the **Andrews and Hitchcock Iron Co.**, later going with the **Mayville (Wis.) Iron Co.**, then to the old **Republic Iron & Steel Co.** at Youngstown, where he was superintendent of blast furnaces. He transferred to the **U. S. Steel Corp.** as superintendent of blast furnaces in Gary, Ind., and 13 years ago took over the direction of the **American Radiator Co.** subsidiary in North Tonawanda, N. Y., as manager.

Norman Saylor, president and sales manager of the **Saylor-Beall Mfg. Co.** for the past 16 years, has been appointed sales manager of the air conditioning division of **Gar Wood Industries, Inc.,** Detroit, Mich.

Irving P. Macauley has been elected vice president of the **Reynolds Metal Co. Inc.,** 19 Rector St., N. Y.

As of September 1, **Ralph Fisher,** formerly of the **Houdaille-Hershey Corporation,** has been appointed Sales Manager of the **Stamping (Eaton Detroit Metal Company)** and **Bumper Divisions** of **Eaton Manufacturing Company,** with headquarters at 9771 French Road, Detroit, Michigan. The Eaton Manufacturing Company has stamping plants located at Cleveland and Massillon, Ohio, and a bumper plant at Jackson, Michigan. Mr. Fisher who has had wide experience in the automobile accessory field will have complete charge of the sales of both of these units of the Eaton Manufacturing Company.

L. A. Bridges has resigned as foundry superintendent of the Brass Foundry Co., Peoria, Ill., and now is residing at Marietta, Ohio. Mr. Bridges has been connected with the foundry industry for 26 years. During the last ten he has held several positions including that of foundry superintendent of the Barnes Foundry Co., Cleveland; Klotz Machine Co., Sandusky, Ohio, and Brass Foundry Co.

Charles Knupfer has been appointed general sales manager of the Carborundum Co. and will be located in Niagara Falls, N. Y., main location of the company's plant, sales and executive offices. Mr. Knupfer represented the Carborundum Co. for many years as continental sales manager in Europe.

John R. Wark has been made Buffalo branch manager of the E. J. Woodison Co., Detroit, Mich., succeeding his father, the late William J. Wark. Mr. Wark has been assistant to his father in the Buffalo office for many years.

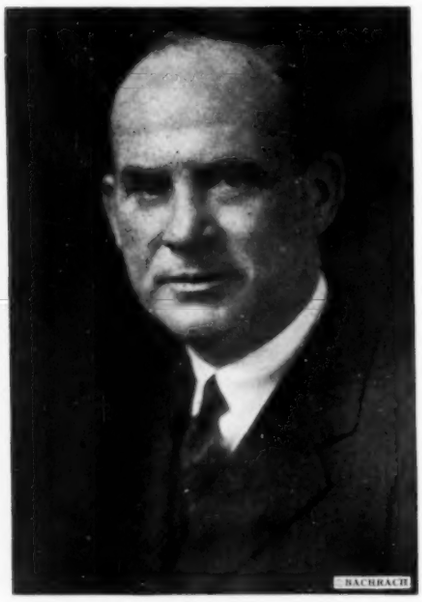
Obituaries

William H. Nicholls

The month of August marked the passing of a leading figure in the foundry, William H. Nicholls, President of the company which bears his name.

William H. Nicholls served the foundry industry for over forty years, the greater part of which time was spent in solving the problems of the foundries to increase production and lower costs. He was the founder of the Wm. H. Nicholls Co. Inc. and in addition to being a foundry production consultant was an inventor with many valuable machinery inventions to his credit. Especially during the years of the World War and the years immediately following were his services sought by foundries seeking to increase their production to meet the ever-increasing demand. He successfully solved their problems and today a great number of the larger foundries in the United States, Canada and Europe attribute their success in producing large quantities of good casting at a minimum cost to the recommendations made by William Nicholls.

He was born and educated in New York City and as a boy of 16 years entered the foundry industry as an apprentice molder, continuing his studies by attending evening school. He studied engineering at the Pratt Institute of Brooklyn. In the early days of his career he served as molder in various foundries in the United States gaining a practical knowledge of the foundry industry in general and studying its future requirements. In 1910 he started in business for himself and thereby laid



WILLIAM H. NICHOLLS

the foundation for the company which is known wherever metals are cast as the Wm. H. Nicholls Co., Inc. of Richmond Hill, Long Island, New York.

The passing of "Bill" Nicholls as he was known to his many friends marks the loss of a very popular figure to the foundry field.

Carl F. Isselmann

Carl F. Isselmann, 47, Aluminum Goods Manufacturing Company executive, died at his home on South Tenth St., Manitowoc, Wis., August 8th. Funeral services were held on August 12th, at St. Boniface Church at 9 a.m.

CARL F. ISSELMANN

Mr. Isselmann was a son of Mr. and Mrs. Frank Isselmann of Manitowoc, and he spent his entire life there. After completing his common school education he entered business college and on completion of his course there entered the employ of the aluminum firm when only 15 years of age. His first position in the then small industry engaged in making combs and novelties, was in the shipping department, which he entered March, 1905. Promotions were rapid for Mr. Isselmann and he advanced to posts of responsibility in the main office of the company until at his death he was sales manager and a vice-president. Six years ago he joined with other officials and employees of the company in membership in the 25 years club of the company.

Despite his responsibilities with the Aluminum Goods Mfg. Co., Mr. Isselmann was drafted to serve the first ward in the City Council in 1919. He served two terms and was chairman of the finance committee in the closing two-year term.

In addition to membership in the Elks and Lakeside Country club, Mr. Isselmann was a member of the Knights of Columbus Eagles and United Commercial Travelers.

In 1914 he married Miss Lottie Zander of this city. Survivors are his widow; a son, John; two daughters, Ruth and Mary Ann; his father, Frank; two brothers, Edward, Harrisburg, Pa., and George, Manitowoc; six sisters, Mrs. Richard Bodwin, Mrs. Norbert Lettenberger, Mrs. Thomas Wattawa, Mrs. Roy Pilger, and Marie, all of this city, and Mrs. Arthur Pratt, Pittsburgh.

Richard T. Thum

Richard Thum, widely known manufacturer, died recently at his home, 1923 Erie Ave., Philadelphia, Pa., after a prolonged illness. Mr. Thum was 56.

He was associated with the Aetna Foundry, the Pennsylvania Bronze and Brass Works, Palmyra Foundry and the Girard Iron Works, and was an honorary member of Cedarbrook County Club. He was affiliated with the Masonic Order, Consistory and Lu Lu Temple. Mr. Thum is survived by his widow, Mrs. Elizabeth Fraser Potts of Glenside, and a son, Richard R. Thum. He was a brother of Mrs. Gertrude Hugo of Ambler; Roland Thum of Los Angeles, and Elwood F. Thum, president of the Palmyra Foundry.

Charles Ward Hall

Charles Ward Hall, 59, of near Morrisville, Pa., owner of All-Aluminum Aircraft, Inc., of Bristol, Pa., was killed instantly late in August in an airplane crash near Trenton. He was driving his metal monoplane to Washington when he became lost in the fog and crashed into a tree. His body was badly crushed. Mr. Hall had been an aviator for many years. He was the inventor of the plane which he was flying and other metal devices. He is survived by a widow and son.—**C. A. L.**

Gus Ewald

Gus Ewald, 35, of 61 Colonial Ave., Trenton, who was injured in an automobile accident on the Brunswick Pike, a few miles from Trenton on July 6, died August 11 in a Newark Hospital. Ewald and his wife and young daughter were on their way to Trenton when their car was struck by a trailer. Mr. Ewald was superintendent of the Trenton district of the Wear-Ever Aluminum Cooking Utensil Co. Burial was at Portsmouth, Va., where he was born.

George P. Hoga

George P. Hoga, proprietor of the Eureka Plating Co., Detroit, Mich., died recently in the Deaconess Evangelical Hospital, Detroit. He was born 46 years ago, and for 18 years previous to founding the Eureka Plating Co. had been connected with the Michigan Plating Co. He leaves his wife and three sisters.—**F. J. H.**

Arthur N. Blanchard

Arthur N. Blanchard, who founded the Milwaukee Metal Working Co., Milwaukee, in 1901, and since that time served as president and treasurer, died on Aug. 11, aged 63 years.

Business Items-Verified

A New England Office, staffed for consulting and sales engineering service to those having problems of instrumentation in manufacturing processes, laboratories, power plants or educational institutions, has been opened recently in Boston by Leeds & Northrup Company, Philadelphia, Pa. Their complete line of measuring, recording and controlling instruments, as well as their electric heat-treating furnaces, will be handled through this office. The address is 422 Chamber of Commerce Building, 80 Federal Street, Boston, Mass.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, has plans for three additions to branch plant at Massena, N. Y., each one-story, 210 x 240 ft., 60 x 120 ft., and 40 x 56 ft. respectively, and will begin superstructures soon. Cost over $125,000 with equipment.

M. W. North, formerly with Simplex Products Co., has been appointed Office Manager by Pyrometer Service & Supply Corporation, 1988 E. 66 St., Cleveland, Ohio.

Night & Day Water Heater Co., Foothill Blvd., Monrovia, Calif., manufacturer of automatic heaters and parts has plans for a one-story addition, about 8,700 sq. ft. floor space. Cost close to $28,000 with equipment. The following departments are operated: stamping, zincing (galvanizing) soldering, brazing and enameling.

Cutler-Hammer, Inc., manufacturers of electric control apparatus, Milwaukee, Wis., announce the extension of their manufacturing facilities to the West Coast. A new plant, at 970 Folsom Street, San Francisco, Cal., began operation this month. Other factories are located in New York City and Milwaukee.

The **Hammond Machinery Builders, Inc.,** Kalamazoo, Michigan, announce the establishment of a new Eastern Branch Office and Sales Rooms at 148 W. 23rd Street, New York City. This new branch is in charge of **W. J. Holtmeier,** Eastern Manager.

St. Louis Blow Pipe & Heater Co. Inc., 1948 N. 9th St., St. Louis, Mo., is building a two-story addition to its plant. The company manufactures unit heaters, air conditioning equipment and fabricates sheet metals, operating nationally under the name "Skinner Heating and Ventilating Co. Inc." The firm operates the following departments: soldering, brazing, grinding.

National Park-O-Graph Corp., Chicago, Ill., has been capitalized at $1,000,000 to manufacture and distribute parking meters. David C. Rockola, 625 W. Jackson Blvd., is president. This firm operates the following departments: brass machine shop, tool room, stamping, polishing and buffing.

Edwards Mfg. Co., 5th and Butler Sts., Cincinnati, Ohio, manufacturer of sheet metal building products, will soon take bids on general contract for a two-story addition, 50 x 125 ft., in part for storage and distribution. Cost close to $50,000 with equipment. The following departments are operated: tool room, rolling mill, spinning, stamping, zincing (galvanizing), soldering, brazing, metal spraying, grinding polishing and buffing.

New Haven Vibrator Co. Inc., New Haven, Conn., is moving office and assembly room to larger quarters.

The **Lea Mfg. Co.** of Waterbury, Conn. announces the appointment of **Lea Products Company,** 686 Notre Dame St. West, Montreal, Canada, as exclusive agents in Canada for its entire line of plating, buffing and polishing supplies.

Westinghouse Electric and Manufacturing Company are installing a new continuous porcelain enameling furnace in their plant at Mansfield, Ohio. Installation is being handled by the **Ferro Enamel Corporation** of Cleveland, Ohio, manufacturers of porcelain enamels and designers of porcelain enameling furnaces.

Mullins Manufacturing Company are dismantling their No. 3 porcelain enameling plant at Salem, Ohio and equipment is being moved to their plant No. 1 which will increase the company's porcelain enameling facilities. Dismantling and re-installation of the large continuous electric U type porcelain enameling furnace is being handled by the **Ferro Enamel Corporation** of Cleveland, Ohio.

The following are now representing **Glyco Products Co. Inc.,** 148 Lafayette St., New York, N. Y. in their respective territories: James O. Meyers, 34 Wardman Rd., Buffalo, Kenmore, N. Y.; **Russell-Hale Chemical Co.,** 2812 Center St., Houston, Texas; **Scobell Chemical Co., Inc.** Rockwood Place, Rochester, N. Y.; **White & Co.,** 7 West Bowery St., Akron, Ohio; **White & Co.,** 1505 Broadway St., Cleveland, Ohio; **Canada Colors & Chems. Ltd.,** 1090 King St., W., Toronto 2, Canada; **Chemicals, Ltd.,** 384 St. Paul St., W., Montreal, Canada; **R. E. Loane,** 512 McGill St., Montreal, P. Q., Canada; **Shanahan's Ltd.,** Ft. of Campbell Ave., Vancouver, B. C., Canada; **Philip Elzas & Co.,** 23 Olga Bldgs., 121 President St., Johannesburg, So. Africa.

Wyandot Steel Products Corp., Upper Sandusky, Ohio, is the name of the reorganized concern formerly the Wyandot Vault Co. W. C. A. Bickham, formerly vice-president of the National Grave Vault Co., Galion, Ohio, has become president and general manager, and P. B. Schnelker, formerly machine shop superintendent of the National Grave Vault Co., has become plant superintendent.

Dobbins Mfg. Co., North St. Paul, Minn., is entering upon an expansion program calling for an additional 20,000 sq. ft. of floor space and a payroll of from 40 to 50 per cent increase. This company manufactures insecticide sprayers and other metal specialties. The following departments are operated: bronze and brass foundry; brass machine shop, tool room, stamping, zincing, soldering, tinning, polishing and buffing, lacquering and enameling.

Schaible Foundry and Brass Works, Inc., Cincinnati, Ohio, purchased the one-story factory building, Woodrow Street, adjoining, on the east, the present Summer Street plant, from the First Investment and Securities Corp. Extensive improvements are being made. This firm operates the following departments: bronze, brass and aluminum foundry; brass machine shop, tool room, polishing and buffing, electroplating.

Modern Metals Corp., warehousers and mill agents of brass, copper and steel alloys, due to increasing business, have leased the building at 2801 S. Kedzie Avenue, Chicago, Ill. The building located on the switch track of the Illinois Northern R.R., is of modern one-story heavy mill construction.

General Plating Co., specializing in chrominum work, has removed to 126 Hamilton Ave., Trenton, N. J., from New Brunswick. **Irving Mines** is owner and president of the company.

The **Pyrometer Service & Supply Corporation** of Cleveland, announces the appointment of **C. E. Noble** as sales engineer. Mr. Noble recently resigned from a position with the **E. C. Atkins Company,** Indianapolis, with whom he served for ten years as Assistant Metallurgist, and more recently in their Sales Organization.

The **Southern Steel Stamping, Inc.,** Brookstown Ave. at S. Cherry St., Winston-Salem, N. C., are considering the installation of a plating plant for plating steel products. They would appreciate information on installations, etc.

American Brass Co., Waterbury, Conn., has approved plans for two one-story additions to the Upper Works at Ansonia, Conn., 75′ x 380′ and 56′ x 360′. Cost over $150,000 with equipment. The buildings will house rod rolling and extruding machinery.

Schick Dry Shaver, Inc., 644 Atlantic St., Stamford, Conn., has let general contract for a three-story and basement addition, 63′ x 135′, to cost over $75,000 with equipment. This firm operates the following departments: tool room, spinning, stamping, soldering, grinding, polishing and buffing, electroplating.

News From Metal Industry Correspondents

New England States

Waterbury, Conn.

September 25, 1936.

Increases in wages, amounting to approximately 5 per cent were announced last month by the **American Brass Co., Chase Companies, Inc., Scovill Mfg. Co., Waterbury Buckle Co.** and **Mattatuck Mfg. Co.** The **Plume & Atwood Mfg. Co.** expects to announce a similar increase shortly.

In addition the **Scovill Mfg. Co.** and **Chase Companies** are now paying time and one-half for all time over 40 hours a week, instead of 45 as previously. The **American Brass Co.** has been doing that for some time.

Mayor Frank Hayes last month called a meeting of the city's leading industrialists to see if they cannot employ more of the persons on the city's relief list. Although business here is nearly up to the 1929 level, the city is caring for nearly 1,300 persons on relief, about four times the number in 1929, in addition to those employed by the WPA. The employers agreed to cooperate with the city and when hiring men to take them from the city's welfare list if possible. Several employers said that there is a shortage of skilled labor but that most of those on relief are unskilled. **John H. Goss,** vice-president of the **Scovill Mfg. Co.** said that he believed a great number of those on relief had been on relief so long that the element of pride had disappeared and that many of them now on relief would have scorned to be on it in 1929.

A local union of the International Union of Mine, Mill and Smelter workers has been formed here, affiliated with the Committee on Industrial Organization. It is claimed to have already 500 members among the various plants.

—W. R. B.

Connecticut Notes

September 25, 1936.

BRIDGEPORT—The **Bridgeport Brass Co.** directors declared the quarterly dividend of 10 cents a share and an extra of 15 cents a share, payable September 30 to stockholders of record September 15. The company has bought the property of the Christian Feigenspan Corp., which adjoins its plant, and expects to erect an addition there shortly.

NEW BRITAIN—The **North & Judd** Mfg. Co.'s annual report shows a net profit of $245,648 for the year ending June 30. This compared with a net profit of $165,380 for the previous year. Besides paying $150,000 in dividends the company added $95,000 to its surplus making it $732,593. Total assets are given as $3,442,923 of which plant and equipment, less reserves are set at $1,715,862 and inventory at $753,702.

THOMASTON—The employees of the **Seth Thomas Clock Co.,** numbering nearly 400, were out on a strike for three weeks last month because of opposition to the new piece work system recently established. They finally voted to return when the company guaranteed that each employee would receive as much pay as he formerly received prior to the establishment of the system, although retaining that system.

Edward H. MacCoul, general superintendent of the company, resigned last month but officials denied that his resignation had anything to do with the strike. He had been with the concern practically all his life. His place has not yet been filled.

TORRINGTON—Net earnings for the **Torrington Co.** for the year ending June 30 were $2,333,877, compared with $2,130,965 the previous year, or $4.16 per share compared with $3.80 per share. The company surplus, after paying dividends of $4.50 a share, was $3,702,158, a reduction of $41,000. President **William R. Reid** and the other officers were reelected last month. Total assets are now $12,158,941, including $8,899,496 in current assets.

BRISTOL—The **Bristol Brass Corp.** last month declared the regular quarterly dividend of 50 cents a share and an extra of 50 cents, payable September 15 to stockholders of record August 31.

MIDDLETOWN—The **Russell Mfg. Co.** has received a contract from the **Ford Motor Co.** for the manufacture of friction brake and clutch linings and as a result some departments are working three shifts daily and seven days a week. The Ford order will not be completed for three or four months.

MERIDEN—The **Miller Co.** directors have elected **S. J. Roby** as vice-president in charge of the lamp division. He has been with the company for 50 years.

NAUGATUCK—The **Risdon Mfg. Co.** has purchased part of the old **Smith & Griggs Co.** plant in Waterbury and is now operating two shifts daily.

—W. R. B.

Providence, R. I.

September 25, 1936.

Non-ferrous industries in Rhode Island made a gain of 14.6 per cent for the month of August in the amount of its bank withdrawals for payrolls as compared with the corresponding month of 1935, according to the monthly figures compiled by the Brown Bureau of Business Research. The jewelry and silverware industries made a gain of 8.8 per cent. As compared with the month of July this year, the gain of the non-ferrous industries was 6.3 per cent and that of the jewelry and silverware, 22.6.

The **Swank Products Company** of Attleboro, Mass., has filed a suit in the Federal Court at Providence, against **Silverman Brothers** of Providence, seeking a permanent injunction to restrain the respondent from alleged patent infringements. The Attleboro company further seeks an accounting of damages and profits.

Jewel-Craft, Inc., is the style of a concern that has been incorporated under the laws of Rhode Island to conduct a manufacturing jewelry business in Providence with an authorized capital consisting of 100 shares of common stock of no par value. The incorporators are: **Mary E. Sawyer, N. V. Monahan** and **Theresa M. Mullen.**

Daniel Jacobs has been appointed by the Superior Court for Providence County, as receiver for **Bojar & Karasik, Inc.,** manufacturing jewelers at 185 Eddy Street.

James J. O'Grady has been appointed mid-western representative of the **Reuckert Manufacturing Company,** Providence jewelry manufacturers, to cover the States of Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Missouri and Kansas, with headquarters at 35 West Wacker Drive, Chicago. He has been associated with the jewelry trade for the past 25 years. **William H. Wade** has been promoted to the sales promotion department of the same company.—W. H. M.

Middle Atlantic States

Utica, N. Y.

September 25, 1936.

Business conditions in Utica and Central New York are decisively on the upgrade with factory executives reporting increased orders and more men at work.

Thomas B. Bergan, district director of WPA for the eight counties in Central and Northern New York, reported private industry is absorbing relief workers rapidly while the **Utica Chamber of Commerce** bulletin shows local industries to be busier than in some time. According to the **State Department of Labor** the payroll increase of 6.7 per cent for the month of August is larger than for any city in the state except New York which reports an increase of 8.9 per cent. Employment gained definitely during the same period.

Due to a dearth of skilled mechanics needed mostly in the metal trade factories of the Mohawk Valley the **New York State Department of Education** is putting forth a plan to remedy the

situation. Factory executives, school officials, and employment groups are cooperating in executing the plan outlined in Utica September 18.

At Ilion installation of new machinery and equipment continues in both the local plants of the **Remington Rand Corporation, Inc.** It was reported the **Dalton Adding Machine** would be assembled at Plant 1 for the present. This work was formerly performed at Norwood, Ohio. Plant officials had no statement to make on the strike situation.—**E. K. B.**

Newark, N. J.

September 25, 1936.

The **Newark Pulley, Bearing and Belt Co.**, subsidiary of Bernstein Bros., of Paterson, has leased a property here and will begin operations shortly. The **Suburban Insulation Co.**, has purchased three buildings at Roselle Park, N. J. The **Stirling Novelty Co., Inc.**, of this city, has filed in the Federal Court a petition to reorganize under provisions of the bankruptcy act.

Titanium Pigment Co., subsidiary of the **National Lead Co.**, of New York City, will construct a wet milling building, 140 by 140 feet, steel and concrete.

Settlement of a strike of more than 1,300 employees of the **Phelps-Dodge Copper Products Co.**, of Elizabeth, has been effected between strikers and company officials. An increase of 10 per cent in hourly, piece and day rates, with time and a half for Sunday and holiday work and all time over 48 hours weekly were the major terms. The company also agreed to review rates in all departments. The employees are affiliated with the United Brass and Copper Workers' Association of Union County.

—**C. A. L.**

Trenton, N. J.

September 25, 1936.

Metal industry plants in Trenton and vicinity, report an increase in business during the past month. The **Crescent Insulated Wire and Cable Company** is now operating twenty-four hours a day and is building an addition to the plant. The **Skillman Hardware Mfg. Co.**, also finds trade picking up. The **Solfo Paint and Chemical Co.**, has contracted for an addition to its plant on Pennington Avenue.

The **General Plating Co.**, specialing in chromium work, has been removed here from New Brunswick and is established at 126 Hamilton Avenue. **Irving Mines** is owner and president of the company.

The following concerns have been incorporated here: **Courtland Chemical Co.**, Paterson, 1,000 shares, no par; **Davenport Chemical Co.**, Camden, $50,000 preferred and 1,000 shares common, no par; **Pine-White, Inc.**, Red Bank, chemicals, $125,000.—**C. A. L.**

Middle West

Cleveland, Ohio

September 25, 1936.

Industrialists in this area are declaring that the so-called depression, is permanently over and cite the fact that each quarterly report for the current year is showing an advancement over the preceding one.

Industrial activities, particularly in the automotive field, for the last two or three weeks have declined, but this is an annual experience and does not have much weight. Most of the plants that have slowed in production, are reconditioning and getting ready for fall activities which, no doubt, will be pressing at an early date.

Plating plants, so closely allied with motor car activities, already are in shape to resume production under more advanced methods. These places are expecting the heaviest production for the early fall and winter that they have experienced within the last six years.

On August 28 in Toledo, **Federal Judge Geo. P. Hahn,** approved the reorganization of the **Willys-Overland Company. Ward M. Canady** and **David R. Wilson,** prominent in the reorganization efforts report the court act permits the new **Overland-Motors, Inc.,** to start manufacturing on a secure financial basis. Schedules call for the continuous production with the first units coming off the assembly line in ample time for exhibition in fourteen major automobile shows in November.—**F. J. H.**

Detroit, Mich

September 25, 1936.

Production in all the brass, copper, aluminum and gray iron plants has been down for the last two weeks or more but much of this is attributed to preparations for the new models.

It may be well along in October before they are back into their regular strides. At least the season is expected to open quite a bit earlier than a year ago.

Manufacturers of air conditioning and refrigeration units, although in heavy production for a long time, are planning for still greater things and it is expected the next few months will witness an unusual peak in this particular field.

Plumbing and steam fitting supply production also is gradually on the increase, much of which is due to demands from the building trade.

Platers are not quite so active, but they will be more so than ever with the resumption of production by the motor car plants.

The **DeSoto Division** of the **Chrysler Corporation** has completed a new $5,000,000 plant and is now installing new machinery which is expected to be ready for operation later in the fall. Giant presses and stamping machinery already have been set up.

It is announced that the **Graham-Paige Motor Corp.** is well under way with an expansion program that will provide a 50 per cent increase in production of the 1937 cars. Under the new schedule it is expected that approximately 5,000 persons will be furnished employment. It is stated that assembly lines and major factory operations are being placed under one roof. Among the changes is the transfer of body building operations from Wayne, Mich., to the main factory on West Warren Ave. in Detroit.

The **Buick Motor Co.**, at Flint, it is stated, has a program under way to increase plant capacity in preparation for its 1937 models. Employment during the fourth quarter of 1936, it is added, is expected to reach a new high.

The first Dowmetal bus manufactured at the plant of the **Dow Chemical Co.**, was exhibited in Detroit and Cleveland recently. Its weight is 7,360 pounds, of which 2,950 pounds is credited to the body. It has a carrying capacity of 21 passengers.

Donald E. Bates, president of the **Reo Motor Car Co.**, at Lansing, has announced that **George E. Smith,** vice-president and purchasing manager, has been promoted to assistant general manager and that domestic sales have been transferred to the supervision of **Elijah C. Poxson. T. F. Cullen** also has been made general advertising manager.

—**F. J. H.**

Pacific States

Los Angeles, Calif.

September 25, 1936.

The **Day and Night Water Heater Co.** of 2320 East 8th St., are enlarging their plant at a cost of $18,000.

The **Bendix Co.**, having large factories in South Bend, Ind., Chicago and New York, have announced that they are looking for a site here and as soon as preliminary arrangements are made, will immediately build a $1,000,000 plant. **Vincent Bendix** is here for location and made the statement. The plant will manufacture all automobile and air craft parts, of steel, brass, bronze and aluminum. **Charles Marcus, H. L. Hill** and **Herbert Sharlock,** executives of this concern are here making arrangements.

The **Nok Lock Co.** are making new door knockers.

The **Vapor Proof Specialty Co.** are making a new line of lighting fixtures.

The **Bardo Corp.** of 1041 North Sycamore St., Hollywood, have gone in for large production of electric generators.

The **Natural Gas Equipment Co.** of 714 West Olympic Blvd., are making a large output of gas burners.

The **Taylor Aircraft Co.** of Bradford, Pa., have opened a Pacific Coast branch factory, at the Municipal airport, Long Beach.

The **Gay Engine Corp.** have bought 58,000 square feet of space at 11th and Soto Sts., to build a large plant for air conditioning and refrigeration lines.

The **American Metal Cap Co.** have started a factory at 719 Gage Ave., to make bottle screw caps and lead tin foil caps for wine bottles.

The **U. S. Porcelain Enamel Co.** of 4635 East 52d Drive, **J. L. Hodgkinson,** president, have added 10,000 more feet of floor space to the factory, put in more equipment and will work largely in metal lines.

The **New Deal Amusement Co.** have moved to 1356 West Washington St., making pin and marble games and a new line of radios.

The **Ward Heater Co.** of 1800 West Washington St., have developed and are making a new heater for bath and bedrooms and have opened a large display room at 818 South Flower St. **R. G. Logue** is vice-president.—**H. S.**

The North Pacific

September 25, 1936.

The **Chevrolet Motor Co. have bought** the former Durant plant at Oakland, 315,000 square feet of floor space, for their automobile and truck factory.

The **Forster Co.** of Berkeley, are now in strong production of seventy types of gas burners and butane equipment.

The **Baker Air Equipment Co.** of 1911 Park St., Alameda, have modernized their plant, for the making of compressors, flowers, gasoline pumps, etc.

The **John T. Raisin Corp.** have built a plant at 155 10th St., San Francisco, to make aluminum foil, under the trade name of "Glorifoil."

The **Kennedy Valve Mfg. Co.** of Elmira, N. Y., have appointed **Leonard E. Shaffer** as coast manager, at 448 10th St., San Francisco, and at 1340 East 6th St., Los Angeles.

The **Standard Trailer Co.** are building a $45,000 plant at Elmhurst, Calif.

Erwin L. Weber of 534 Medical Arts Building, Seattle, is manufacturing a new improved line of hot water heating appliances.—**H. S.**

Metal Market Review

September 25, 1936.

Copper was under pressure in two directions: upward from the trend of prices abroad and in place from the attitude of some of the largest producers in the United States. Consequently it remained unchanged at 9.75c per lb. delivered Connecticut Valley. For the first time since the impost of the copper tariff, foreign copper rose in price above American; now selling at 9.85-.90 c.i.f. Hamburg, Liverpool and Havre. Sales in the past five weeks were 4,943 tons; 3,450; 4,896; 17,386 and 9,615 tons making a total of 40,290 tons.

Statistics show a reduction in the domestic stocks. The market is firm and the general expectation is that copper can move in only one direction—upward.

Zinc, firm throughout the last month justified this firmness by moving from 4.80 to 4.82½ and then to 4.85c per pound, f.o.b. E. St. Louis. The explanation of this firmness was a reduction in stocks of refined metal. Sales for the past weeks were very good, going as high as 31,784 tons in one week.

Tin drifted aimlessly for the first two weeks since our last issue with quiet demand and no great selling pressure, remaining between 42 and 43 cents per pound. During the week of September 3rd, however, consumers entered the market for substantial tonnages and quotations moved upward rapidly thereafter to as high as 45.25. Sales continued to be good and the price at the time of writing is 45.125.

International Tin Committee's meeting in London on September 23rd passed with only an announcement that the quota had been renewed at 90 per cent with no news since.

Lead, although quotably unchanged throughout, has also been active and the atmosphere is buoyant. Sales amounted to 4,000 tons; 7,200; 18,500; 18,500 and 10,400 tons, totalling 58,600 tons. Statistics show a substantial drop in refined lead stocks during August, 12,848 tons. How long the price will remain at 4.45c per lb. E. St. Louis, is considered problematical.

Silver remained unchanged at 44.75c per ounce with only ordinary activity and no excitement. The output continues very high, 4,616,000 ounces in the United States in July and 34,468,000 ounces from January to July inclusive, compared with 20,000,094 ounces of the same period of last year.

Platinum, which we last reported at about $53 has since climbed to $70 per ounce. The reasons obtainable are largely guesses, varied and numerous.

Undoubtedly some rise was due to the fact that platinum was too low at $30 and improved consumption in the arts and industries had their natural effect. However, the doubling in price which has taken place during the past few months, cannot be accounted for on such grounds alone. Undoubtedly speculation has had a great deal of influence. The future is uncertain.

Scrap Metals have been strong, partly because of the trend of the primary metal market and partly because of the low offerings, with export bids rising.

The Bureau of Mines report indicates that the secondary copper produced as metal and recovered in alloys in 1935, totalled 448,906 tons, an increase of 22 per cent over 1934; secondary lead, 270,400 tons, a gain of 29 per cent; zinc 94,350 tons, a gain of 42 per cent; aluminum recovered, up 11 per cent.

Brass ingot bookings in July set a new record, 16,249 tons. They continued to be good and at this time deliveries are high, amounting to 6,379 tons in August, an increase of 40 tons over the July record.

Early in September, the prices of secondary aluminum alloys were advanced ½ to ¾ cent per lb.

Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending September 4:

80-10-10 (1½% Imp.)	11.064c
78% Metal	8.784c
81% Metal	9.061c
83% Metal	9.279c
85-5-5-5	9.537c
No. 1 Yellow Brass	7.832c

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for the month of August, 1936, amounted to 6,379 tons.

The **Wrought Metal Industry** continues to be in very satisfactory condition. On September 10, Revere Copper and Brass advanced its list prices of all products ¼c a pound and a number of their discounts on extras were reduced. Waterbury reports continued gains in employment, now being within 93.7 per cent of its record employment mark. Chase, American and Bridgeport Brass companies increased their men's pay 5 per cent early in September. According to the Copper & Brass Research Association the tonnage of brass pipe and copper tube consumption in the building industry during 1936 exceeded the consumption in any boom year by more than 10,000,000 pounds in spite of the still comparatively low state of that industry. Wire mills and cable manufacturers are also very busy.

A large Metropolitan distributor reports business during September to be 15 per cent ahead of August and 32 per cent ahead of September, 1935.

AVERAGE PRICES FOR METALS

	AUGUST
Copper c/lb. Duty 4c/lb.	
Lake (del. Conn. Producers' Prices)	9.812
Electrolytic (del. Conn. Producers' Prices)	9.75
Casting (f.o.b. ref.)	9.40
Zinc (f.o.b. E. St. Louis) c/lb. Duty 1¾ c/lb.	
Prime Western (for Brass Special add 0.05)	4.801
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	42.569
Lead (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	4.450
Aluminum c/lb. Duty 4 c/lb.	20.500
Nickel c/lb. Duty 3 c/lb. Electrolytic 99.9%	35.00
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	12.571
Silver c/oz. Troy, Duty Free	44.750
Platinum $/oz. Troy, Duty Free.	48.119
Gold—Official U. S. Treasury Price $/oz. Troy	35.00

Metal Prices, September 25, 1936

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.875, Electrolytic, 9.75, Casting, 9.40.
Zinc: Prime Western, 4.85. Brass Special, 4.95.
Tin: Straits 45.20.
Lead: 4.45. **Aluminum,** 19-22. **Antimony,** 12.50.
Nickel: Shot, 36. Elec., 35.

Quicksilver: Flasks, 75 lbs., $89. **Bismuth,** $1.00.
Cadmium, 75c to 95c. **Silver,** Troy oz., official price, N. Y., Sept. 25, 44.75c. **Gold:** Oz. Troy, Official U. S. Treasury price, Sept. 25, $35.00. **Scrap Gold** 63¼c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $70.00

Duties: Copper, 4c lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U S. Import Duty	Tax*
No. 1 Yellow Brass	8.00	None	4c. lb.[1]
85-5-5-5	9.75	None	4c. lb.[1]
88-10-2	13	None	4c. lb.[1]
80-10-10	11¼	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	10.00	None	4c. lb.[1]
Aluminum Bronze	14.25	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a. v.	None
Nickel Silver (12% Ni)	12.00	20% a. v.	4c. lb.[1]
Nickel Silver (15% Ni)	14.25	20% a. v.	4c. lb.[1]
No. 12 Aluminum	16.50-20	4c. lb.	None
Manganese Copper, Grade A (30%)	18-23	25% a. v.	3c. lb.[1]
Phosphor Copper, 10%	12-14	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	13.25-15	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	18-30	45% a. v.	4c. lb.[1]
Phosphor Tin, no guarantee	49-75	None	None
Iridium Platinum, 5% (Nominal)	$75.00	None	None
Iridium Platinum, 10% (Nominal)	$80.00	None	None

* Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1] On copper content. [2] On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	7⅜ to 7½	Free	4c. per pound on copper content
Light copper	6⅜ to 6½	Free	
Heavy yellow brass	4¼ to 4⅜	Free	
Light brass	4 to 4⅛	Free	
No. 1 composition	6 to 6⅛	Free	
Composition turnings	5⅞ to 6	Free	
Heavy soft lead	3.90 to 4	2⅛c.lb.	None
Old zinc	2½ to 2⅝	1½c.lb.	
New zinc clips	3½ to 3¾	1½c.lb.	
Aluminum clips (new, soft)	13½ to 14	4c.lb.	
Scrap aluminum, cast	12 to 12¼	4c.lb.	
Aluminum borings—turnings	6 to 6¼	4c.lb.	
No. 1 pewter	30 to 31	Free	
Electrotype	4 to 4⅛	2⅛c.lb.*	
Nickel anodes	24 to 25	10%	
Nickel clips, new	33 to 35	10%	
Monel scrap	8½ to 15	10%av.	

* On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since September 10, 1936. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	17½c.	2½c. lb.
Bare wire, soft, less than carloads	13½c.	25% a v.
Seamless tubing	18 c.	7c. lb.

* Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	15⅝c.	16½c.	17⅜	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	15⅞c.	16¾c.	17⅝	25%	
Rod	13⅝c.	16¾c.	17½	4c. lb.	
Angles, channels.	23⅜c.	24½c.	25⅛	12c. lb.	
Seamless tubing.	17⅞c.	18½c.	19⅜	8c. lb.	
Open seam tubing	23⅜c.	24½c.	25⅛	20% a.v.	

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	24⅞c.	10% Quality	27½c.
15% Quality	27 c.	15% Quality	31⅞c.
18% Quality	28¼c.	18% Quality	35⅛c.

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound. (Duty 4c. lb.; import tax 4c. lb. on copper content.)	
Tobin Bronze Rod	17½c.
Muntz or Yellow Rectangular and other sheathing	18⅞c.
Muntz or Yellow Metal Rod	15 c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, ton lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	49c.	Cold Rolled Sheet	53c.
Hot Rolled Rods	44c.	Standard Sheet	48c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	34	Standard Sheets (base)	38
Cold Drawn Rods (base)	39	Cold Rolled Sheets (base)	43

SILVER SHEET

Rolled sterling silver (Sept. 25) 47c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	8.00	2½c. lb.
Cut Lead Sheet (base price)	8.25	2½c. lb

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 416.

Supply Prices, September 25, 1936

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 17 c. per lb.
Electrolytic, full size, 15¼c. cut to size 15¼c. per lb.
Rolled oval, straight, 15¾c.; curved 16¾c. per lb.
Brass: Cast ..... 17½c. per lb.
Zinc: Cast ..... 10⅛c. per lb.

Nickel: 90-92% ..... .45 per lb.
95-97% ..... .46 per lb.
99%+cast, 47c.; rolled, depolarized, 48.
Silver: Rolled silver anodes .999 fine were quoted Sept. 25, from 48c. per Troy ounce upward, depending on quantity.

WHITE SPANISH FELT POLISHING WHEELS

Even Diameters	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.35/lb.	$2.23/lb.	$2.12/lb.
10-12-14 & 16	2 to 3½	2.35	2.23	2.12
6-8 & 18	1 to 2	2.35	2.23	2.12
6-8 & 18	2 to 3½	2.35	2.23	2.12
Over 18	Under ½	3.80	3.61	3.42
Over 18	½ to 1	3.45	3.28	3.11
Over 18	Over 3½	2.80	2.66	2.52

Odd Diameters

Less than 50 lbs.—add 40c. per lb. to "Even Diameters" list. 50 lbs. or over—all one size and consistency and in one shipment —same as "Even Diameters."

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$71.13
14" 20 ply 84/92 Unbleached	54.58
12" 20 ply 84/92 Unbleached	41.09
16" 20 ply 80/92 Unbleached	59.37
14" 20 ply 80/92 Unbleached	45.64
12" 20 ply 80/92 Unbleached	34.45
16" 20 ply 64/68 Unbleached	51.26
14" 20 ply 64/68 Unbleached	39.47
12" 20 ply 64/68 Unbleached	29.86
⅜" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.07-.13½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.16¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.029
Alcohol—Butyl, drums	lb.	.09½-.12
Denatured, drums	gal.	.30-.476
Alum—Lump, barrels	lb.	.03¼-.03½
Powdered, barrels	lb.	.0340-.0365
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	1.05
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	.21½-.23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, 53/55% cu., bbls.	lb.	.15½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	.04½-.05
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
*Gold Cyanide, Potassium		$15.45
*Gold Cyanide, Sodium		$17.10
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.016
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls.	lb.	.12½
Lime Compositions for Nickel	lb.	.08-.11
Lime Compositions for Brass	lb.	.08-.11
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅝
Potassium—Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.07⅜
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38
Cyanide, 100 oz. lots	oz.	.45¾
Nitrate, 100 ounce lots	oz.	.32¾
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	2.55-3.15
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.03
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.30-.33
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb	.02¾
*Tin Chloride, 100 lb. kegs	lb.	.35½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
White Silica Compositions for Brass	lb.	.07½-.10
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.37-.38
Chloride, drums, bbls.	lb.	.06
Sulphate, bbls.	lb.	.033

*Subject to fluctuations in metal prices.